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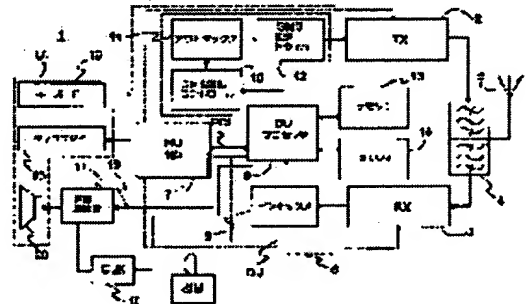
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(54) MOBILE COMMUNICATION SYSTEM, MOBILE STATION AND METHOD FOR PROGRAMMING
CALL TONE OF TELEPHONE SET

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a method for
programming a call tone of a telephone set.SOLUTION: A call tone is stored in a call tone memory 14 in
a telephone set by this method and is reproduced as a
response to an incoming call by an acoustic reproducing
device 20. The call tone in this method is converted into
characters including specifications of notes and the
characters are sent to the telephone set in a form of, e.g. a
short message. The characters received by the telephone set
are converted into a form that can be stored in the memory.

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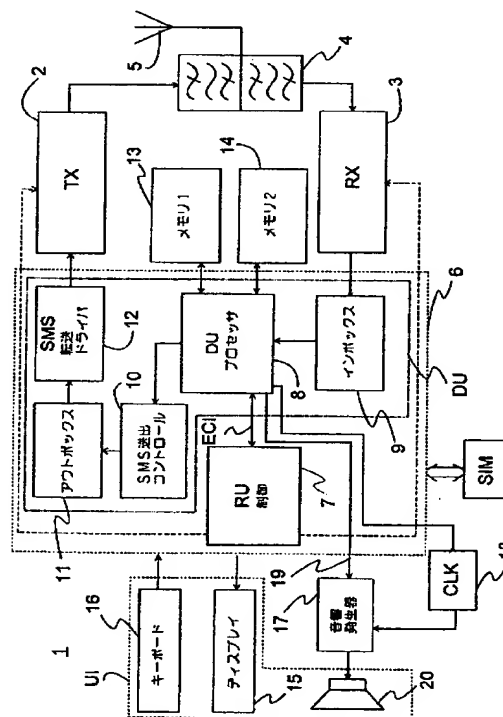
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(54) 【発明の名称】 移動通信システム、移動局、及び電話機の呼び出し音をプログラミングする方法

(57) 【要約】

【課題】 電話機の呼び出し音をプログラミングする方法を提供することを目的とする。

【解決手段】 この方法では、電話機において、呼び出し音は呼び出し音メモリ14に記憶されて、入り呼に対する応答として音響再生装置20によって再生される。この方法では、呼び出し音は、音符の仕様を含む文字に変換されて、その文字は例えばショートメッセージで電話機に送られる。電話機においては、受信された文字は、メモリに記憶され得る形に変換される。



【特許請求の範囲】

【請求項 1】 移動通信網と、無線通信用の少なくとも 1 つの移動局 (MS) とから成る移動通信システムにおいて、

音声を送受信するための手段 (TX、RX) と、
呼び出し音を記憶するメモリー (14) と、
その呼び出し音を入り呼の信号として再生するための手段 (20) とを有し、

該メモリー (14) に記憶されている呼び出し音を文字に変換して該文字を送るための手段 (8、10-12) と、前記文字を、その伝送情報が呼び出し音伝送情報であると特定する呼び出し音識別子とともに送るための手段 (8) とを有することを特徴とする移動通信システム。

【請求項 2】 移動通信網と、無線通信用の少なくとも 1 つの移動局 (MS) とから成る移動通信システムにおいて、

音声を送受信するための手段 (TX、RX) と、
呼び出し音を記憶する呼び出し音メモリー (14) と、
その呼び出し音を入り呼の信号として再生するための手段 (20) とを有し、

文字を伴うメッセージを受信するための手段 (9) と、
受信されたメッセージの中の、そのメッセージが呼び出し音であることを知らせる呼び出し音識別子を検出するための手段 (8) と、

呼び出し音を文字として受信するための手段と、
前記文字を、該呼び出し音メモリー (14) に記憶される形に変換するための手段 (8) とを有することを特徴とする移動通信システム。

【請求項 3】 音声を送受信するための手段 (TX、RX) と、

呼び出し音を記憶する呼び出し音メモリー (14) と、
その呼び出し音を入り呼の信号として再生するための手段 (20) とを有する無線通信用の移動局 (MS) において、

該メモリー (14) に記憶されている呼び出し音を文字に変換して該文字を送信するための手段 (8、10-12) と、前記文字を、その伝送情報が呼び出し音伝送情報であると特定する呼び出し音識別子とともに送るための手段 (8) とを有することを特徴とする移動局。

【請求項 4】 音声を送受信するための手段 (TX、RX) と、

呼び出し音を記憶する呼び出し音メモリー (14) と、
その呼び出し音を入り呼の信号として再生するための手段 (20) とを有する無線通信用の移動局 (MS) において、

文字を伴うメッセージを受信するための手段 (9) と、
受信されたメッセージの中の、そのメッセージが呼び出し音であることを知らせる呼び出し音識別子を検出するための手段 (8) と、

呼び出し音を文字として受信するための手段と、

前記文字を、該呼び出し音メモリー (14) に記憶される形に変換するための手段 (8) とを有することを特徴とする移動局。

【請求項 5】 電話機の呼び出し音をプログラミングする方法において、呼び出し音をメモリー (14) に記憶させて音響再生手段 (20) によって入り呼に対する応答として再生するようになっており、呼び出し音を文字に変換して、その伝送情報を呼び出し音伝送情報であると特定する呼び出し音識別子とともに文字として該電話機に送ることを特徴とする方法。

【請求項 6】 音符の指定を含む文字として呼び出し音を電話機に送ることを特徴とする請求項 5 に記載の方法。

【請求項 7】 電話機において、メッセージを受信してそのメッセージの中の呼び出し音識別子を検出するとき、呼び出し音を文字として受信して、その文字をメモリーに記憶され得る形に変換することを特徴とする請求項 5 に記載の方法。

【請求項 8】 該文字をショートメッセージで送ることを特徴とする請求項 5 に記載の方法。

【請求項 9】 データ伝送用の端末装置において、該端末装置は呼び出し音を記憶する呼び出し音メモリー (14) と、その呼び出し音を送信するための手段とを有し、該呼び出し音を文字に変換して該文字を送るための手段 (8、10-12) と、前記文字を、その伝送情報が呼び出し音伝送情報であると特定する呼び出し音識別子とともに送るための手段 (8) とを有することを特徴とする端末装置。

【請求項 10】 移動通信システムのショートメッセージ・サービスセンターとの接続を確立するための手段と、該ショートメッセージ・サービスセンター (SMSC) を通して前記文字をショートメッセージで送信するための手段 (8、10-12) とを有することを特徴とする請求項 9 に記載の端末装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、電話機の呼び出し音をプログラミングする方法に関し、この方法では、電話機において呼び出し音は呼び出し音メモリーに記憶され、入り呼に対する応答として音再生手段によって再生される。本発明は、移動局及び移動通信システムにも関するものであり、該システムは移動通信網と、無線通信用の少なくとも 1 つの移動局とから成り、該システムは音声を送受信するための手段と、呼び出し音を記憶するメモリーと、入り呼の信号としてその呼び出し音を再生するための手段とを有する。

【0002】

【従来の技術】 移動電話は、元々、普通の電話機と同様に呼び出し音を持っており、それは大概是時計の鳴る音

に似ている。特定の型とモデルの移動電話が 1 つの決まった呼び出し音だけを持っているときには困った状況が生じる。同じ場所にいる二人のユーザーが同じタイプの、従って同じ種類の呼び出し音を発する移動電話を持っていると、本当に鳴っている電話機が誰のか分からなくて紛らわしい。この問題は、呼び出し音をユーザー自身の電話番号又は発呼者の電話番号に依存させることによって解決されている。しかし、2 つの殆ど同じ電話番号に基づいて発せられる呼び出し音は非常に良く似て聞こえるので、1 つの呼び出し音を他の呼び出し音と区別するのは難しい。また、電話番号に基づいて呼び出し音を作ることにより、主に音色の異なる呼び出し音効果が達成されているが、それはユーザーをいらだたせることさえあるかも知れない、即ち、ユーザーは自分の好みに合うように呼び出し音を選ぶことができない。

【0003】この問題は、移動電話が進歩するに連れて更に解決されている。現在、移動電話には通常は数種類の呼び出し音が予め記憶されていて、ユーザーはそこから好みの呼び出し音を選べるようになっている。普通の呼び出し音の他に、最新の技術によって、広く親しまれている音楽作品の中のメロディーが呼び出し音として実現されており、それらも、選択できる呼び出し音となっている。移動電話が非常に広く利用されるようになってきて、他の誰かの電話機が鳴っているときに幾人もの移動電話のユーザーが、鳴っているのは自分の電話機だと思ふ問題を解決するには、移動電話の呼び出し音は 10 種類もあっても不十分であることが分かった。また、予め記憶されている呼び出し音のどれもユーザーの気に入らないということもあり得る。限られた種類の呼び出し音しか持っていない普通の電話機では、しばしば同様の問題が起きる。

【0004】電話機又はその他の通信装置のユーザーインターフェースによって呼び出し音をプログラムできるようにすることによって、この様な事情が改善されている。1 つの解決策が米国特許第 4 8 6 6 7 6 6 号に開示されており、その解決策によれば、ユーザーは、周波数、パルス長、グループ中のパルスの数、パルスとパルスとの間の時間、パルスのグループの数、などの、パルスの形の呼び出し音シーケンスを定義する種々のパラメータを電話機に入力することができる。これらのパラメータは種々の数として入力される。他の解決策が公報 WO 9 2 / 0 3 8 9 1 に開示されており、その解決策では、マトリックス・ディスプレイ上の特定の画素をオンに切り換え或いはそれを照明することによってページング装置の呼び出し音をプログラムすることができる。画素の垂直方向の位置は音符 (E、F、G、A、H、C、D) の特定の音高 (pitch) に対応し、音符の持続時間は連続する画素に応じて決定される。他の対応する解決策が公報 EP 6 8 4 5 9 1 A 1 に開示されており、その解決策では、ページング装置のディスプレイ上で呼び出

し音をプログラムすることが可能であり、音符の音高はディスプレイ上に文字記号 (DO、RE、MI、FA、SO、LA、TI) として表示され、音符の持続時間を数個の同じ文字記号のシーケンスとして変えることができるようになっている。上記の解決策には呼び出し音のプログラミングに関して欠点があるので、1996 年 2 月 23 日に出願されたフィンランド特許出願 9 6 0 8 5 8 に或る解決策が開示されており、その解決策では、例えば、ディスプレイ上に表示された楽譜上に音符を直接に図形の音符の形で入力することによって呼び出し音を音符としてプログラムすることが可能である。

【0005】しかし、ユーザーインターフェースを通じての呼び出し音のプログラミングには欠点がある。ユーザーは、種々のパラメータ、文字或いは音符を種々の方法で入力するという面倒な手続きをとらねばならない。また、上記の例の多くで、ユーザーは自分の電話機で特定のメロディーを作るために音楽理論の知識を持っていると想定されている。

【0006】呼び出し音のプログラミングを容易にするための解決策が米国特許第 4 8 6 8 5 6 1 号に開示されており、その解決策ではページング装置の所有者は、そのページング装置のための新しい呼び出し音を空中経由で入手することができる。それは次のようにして達成される、即ち、ページング装置の所有者はページングシステムのオペレータに電話をかけて該ページング装置の識別子 (電話番号) を知らせ、自分が既に持っているカタログから希望の呼び出し音を選択してその呼び出し音の識別子をページングシステムのオペレータに知らせる。この場合、ページング送信装置は、始めに呼び出し音変更メッセージをページング装置に送ることによってページング装置に呼び出し音変更の準備をさせ、その後ページング送信装置は呼び出し音シーケンスを送り、ページング装置は、メモリーに記憶されていた呼び出し音シーケンスを空中を経由して受信した新しい呼び出し音シーケンスと取り替える。

【0007】呼び出し音をプログラミングするための上記の解決策では、ユーザーはいろいろな呼び出し音を扱うページング送信装置に個々に接触をする必要があり、また、ユーザーはページング送信装置とユーザーのカタログとに載っていて、従ってその識別子を自分が知っている呼び出し音を入手できるに過ぎないという欠点がある。また、呼び出し音シーケンスが送信されているときにはチャンネルが話中のままに保たれるので、その間はページング装置はページングメッセージを同時に受信することはできない。同様に、ページングシステムのオペレータだけがプログラミングを実行できる、即ち呼び出し音シーケンスを空中経由で送信することができないという欠点がある。更に、ページング装置 (その呼び出し音メモリー) は始めに呼び出し音変更に向けて準備をしなければならず、そのための付加的な送信を要す

る。

【0008】

【発明が解決しようとする課題】空中を経由してオーディオを送ることと関連する他の解決策が公報WO96/06417に開示されており、これは、送信装置がペー
ジャーに送られるページングメッセージに楽曲音 (audi
o composition) を含めることのできるページングシス
テムを開示している。ページャーは、そのメッセージを
受信すると通常の警報音を発し、ユーザーがそのメッ
セージを読むときにメッセージデータがディスプレイで表
示されるとともに、そのメッセージに含まれていた楽曲
音がオーディオ変換器によって再生され、この様にして
聴覚情報及び視覚情報を混ぜ合わせることによって情報
の表現力が高められている。しかし、この公報は、警報
音即ちページャーの呼び出し音のプログラミングを提案
してはいない。

【0009】

【課題を解決するための手段】本発明は、呼び出し音を
プログラミングする可能性を大きくする呼び出し音プロ
gramming装置及びそのための方法からなる。その方法
では、呼び出し音は、そのメッセージを呼び出し音であ
ると特定する識別子を含む呼び出し音メッセージの形で
移動局に送られ、受信されるとその呼び出し音メッセ
ージは呼び出し音識別子に基づいて特定され、その後該
メッセージは呼び出し音発生器及びメモリーに適する形
に修正される。呼び出し音は好ましくは無線通信によっ
て伝送される。この場合、事前の通告無しに、また始め
に呼び出し音メモリーに入ってくる呼び出し音のために
準備させることなく、呼び出し音を直接受信装置に送る
ことができる。呼び出し音を、音声チャネルを通して、
或いは音声チャネルとは別に移動データ通話として送る
ことができる。音声チャネルとは別の、USSD (Unst
ructured Supplementary Service Data (未構造化補助
サービスデータ)) で、或いは例えばIrDa型のオフ
ライン赤外線リンクによって、呼び出し音をショートメ
ッセージの文字として送ることができる。USSDは、
GSM規格において、例えばTS GSM 02.04、TS GSM 0
2.30、TS GSM 02.90、TS GSM 03.38、TS GSM 03.40など
の文書で、詳しく指定されている。本発明の移動局は、
メッセージ中の呼び出し音識別子を検出して、受信した
呼び出し音メッセージを呼び出し音発生器及び呼び出し
音メモリーのために修正するための手段を有する。本発
明の移動局は、呼び出し音メモリーに記憶されている呼
び出し音を第2の移動局に送ることができるように修正
するための手段を有することができる。送信のために移
動局は呼び出し音識別子をメッセージに付加するための
手段を有する。呼び出し音は好ましくは音符データとし
て送られ、その場合、受信時にその音符データはその呼
び出し音を指定する音符に修正される。

【0010】本発明は、移動局を伴う移動通信システム

と、無線通信の移動局とに関し、それは、音声を送受
信するための手段と、呼び出し音を記憶するメモリー
と、その呼び出し音を入り呼の信号として再生するた
めの手段とを有するとともに、該メモリーに記憶されて
いる呼び出し音を文字に変換して送るための手段と、前記
文字を、その伝送情報を呼び出し音伝送情報であると特
定する呼び出し音識別子とともに送るための手段とを有
することを特徴とする。

【0011】また本発明は、移動局を伴う移動通信シ
ステムと、無線通信の移動局とに関し、それは、音声
を送受信するための手段と、呼び出し音を記憶する呼び
出し音メモリーと、その呼び出し音を入り呼の信号とし
て再生するための手段とを有するとともに、文字を伴う
メッセージを受信するための手段と、受信されたメッセ
ージの中の、そのメッセージが呼び出し音であることを知
らせる呼び出し音識別子を検出するための手段と、呼び
出し音を文字として受信するための手段と、前記文字を
該呼び出し音メモリーに記憶される形に変換するための
手段とを有することを特徴とする。

【0012】更に本発明は電話機の呼び出し音をプロ
grammingする方法に関し、その方法では、呼び出し音は
メモリーに記憶されて音響再生手段によって入り呼に対
する応答として再生され、この方法は、呼び出し音が文
字に変換されて、その伝送情報を呼び出し音伝送情報で
あると特定する呼び出し音識別子とともに文字として電
話機に送られることを特徴とする。

【0013】本発明はデータ伝送用の端末装置にも関
し、その端末装置は、呼び出し音を記憶する呼び出し音
メモリーと、その呼び出し音を送信するための手段とを
有するとともに、該呼び出し音を文字に変換して前記文
字を送るための手段と、前記文字を、その伝送情報が呼
び出し音伝送情報であると特定する呼び出し音識別子と
ともに送るための手段とを有することを特徴とする。

【0014】本発明の第1実施例では、呼び出し音は文
字としてショートメッセージで送られる。呼び出し音が
ショートメッセージで移動局に送られるとき、そのメッ
セージは音声チャネルを話中状態 (engaged) に保たな
いので、ユーザーは同時に移動局で話しをしていること
ができる。該ショートメッセージは伝送チャネルのメモ
リーに記憶され、その場合、呼び出し音は、たとえ移動
局が話中であったり或いは伝送中にオフに切り換えられ
たとしても、移動局に送られる。

【0015】コンピュータからインターネットを通して
呼び出し音をショートメッセージで送ることもできる。
従って、移動局のユーザー同士が呼び出し音を互いに送
り合うことができる。呼び出し音は好ましくはショート
メッセージ中の文字の形で音符データとして送られる。
受信側の移動局はそのショートメッセージを普通のショ
ートメッセージとして受信し、その入ってくるメッセ
ージについての事前の通告は不要である。ショートメッセ

ージは所定の識別子を持っていて、それに基づいて受信側の移動局はそれを呼び出し音として特定して、それを呼び出し音メモリに記憶させる。また、本発明の移動局では、好ましいことにユーザーインターフェースによって呼び出し音を自分でプログラムすることが可能であり、その場合にはユーザーは、自分たちでプログラムした呼び出し音や移動局のメモリに記憶されている他の呼び出し音を互いに送り合うことができる。従って、メモリに記憶されている受信された呼び出し音をユーザーインターフェースによって修正することもできる。

【0016】本発明は呼び出し音のプログラミングを簡単にするものであり、移動局のユーザーは新しい呼び出し音を入手するために操作を行う必要はない、即ち、呼び出し音をユーザーインターフェースによってプログラムする必要もないし、移動局に呼び出し音を受け取るための準備をさせる必要もなく、無線通信でそれを直接受信することができる。また、本発明は呼び出し音をプログラミングする可能性を増大させるものであり、ユーザーは第2のユーザーから呼び出し音を受信することができる。呼び出し音メッセージは呼び出し音識別子を含んでいるので、ユーザーが何もしなくても移動局自体が受信したメッセージを呼び出し音として特定するので、呼び出し音の受信が容易である。

【0017】次に、添付図面を参照して本発明を詳しく説明する。

【0018】

【発明の実施の形態】本発明の第1実施例の理解のために、ショートメッセージの送受信について次に説明する。

【0019】GSMシステム等のデジタル移動通信システムでは、通話及びデータ伝送の他に、短いテキストメッセージ、即ちいわゆるショートメッセージ、を送ることもできる。GSMシステムでは、それはSMS (Short Message Service) として知られている。移動局により、テキストメッセージを第2の移動局から受け取ることも第2の移動局へ送ることもできる。GSMシステムのショートメッセージ・サービスの利点の1つは、普通の回線結合通信が行われているときに、例えば通話中に、ショートメッセージを同時に送ったり受け取ったりできることである。従って、呼が入ってくる可能性に備えて、ショートメッセージが送信されていても移動局は話中状態 (engaged) には保たれない。

【0020】電話機での通話との比較でのショートメッセージの利点は、ショートメッセージが送信されるときに受信装置に接触できなくても該メッセージを受信装置に送れることである。これは、第1の移動局から第2の移動局へのショートメッセージの送信を図1に示されているように2部分に分割することによって実現されている：即ち、ショートメッセージは送信を行う移動局MS 1からSM-SC (Short Message Service Centre (シ

ョートメッセージ・サービスセンター)) へ送られ、ここでショートメッセージが記憶され、更に、接触でき次第直ちに実際の宛先、即ち受信側の移動局MS 2へ更に送られる。図2に、ショートメッセージ・サービスセンターSM-SCから移動通信システムへの接続が詳しく図解されている。次に、図1-5を参照して、いろいろなインターフェースの間でのショートメッセージの伝送及び流れについて説明する。

【0021】図2は、移動通信システムの構造と、ショートメッセージを伝送するための接続とを示している。移動局MSは無線通信によって基地局BTSに接続される。基地局BTSは更に、いわゆるAbisインターフェースを通して、幾つかの基地局を制御し管理する基地局コントローラBSCに接続される。幾つかの(通常は、数十個)基地局BTSと、それらの基地局を制御する1つの基地局コントローラBSCとから成る実体は基地局システムBSSと呼ばれている。特に、基地局コントローラBSCは無線通信チャネルとハンドオーバーとを管理する。一方、基地局コントローラBSCは、いわゆるAインターフェースを通して移動サービス交換センターMSCに接続されており、このMSCは移動局からの接続及び移動局への接続の両方の形成を調整する。移動サービス交換センターMSCを通して、移動通信網の外への接続が更に形成される。前述のショートメッセージ・サービスセンターSM-SCは移動サービス交換センターMSCに結合されている。

【0022】ユーザーは、移動局MS 1 (図1) によってショートメッセージを送りたいときには、(該移動局のユーザーインターフェースを使って) 送られるべきメッセージを書き込み或いはメモリから検索し、そのメッセージを送ろうとしている移動局MS 2の電話番号、即ち移動局MS 2の識別子、を呈示する。また、移動局は、接触情報を、即ちショートメッセージ・サービスセンターSM-SCの電話番号を持っているべきである。通常、それは移動局のメモリに記憶されており、その場合には各ショートメッセージを送信しようとする毎に電話番号を別々に入力する必要はない。したがってショートメッセージを送るとき、該メッセージは移動局MSから基地局BTSに行き、そこから基地局コントローラBSC及び移動サービス交換センターMSCを通して更にショートメッセージ・サービスセンターSM-SCに行く。ショートメッセージはショートメッセージ・サービスセンターSM-SCに記憶され、そこから該ショートメッセージは更に受け取り側の移動局MS 2に送られるが、その場合には該メッセージの経路は同一の伝送経路であるが方向は逆である。ショートメッセージ・サービスセンターSM-SCは、移動局MS 2がそのショートメッセージを受け取ったか否か通知を受ける。従って、もし移動局MS 2が何らかの理由でそれを受け取っていないければ、そのショートメッセージを送り直すこと

ができる。

【0023】また、PCからショートメッセージを送ることができる。この場合、移動サービス交換センターMSCはサーバーGTW（ゲートウェイ）と接続し、このサーバーはインターネットと接続している。この場合、インターネットと接続しているPCは、ショートメッセージの送信のために、例えばサーバーGTWにあるWWW（World Wide Web（ワールドワイドウェブ））ページをインターネットからダウンロードすることができる。このWWWページにユーザーは受け取り側移動局MS2の電話番号と、送信するメッセージとを入力すると、そのメッセージを該PCから送れるようになり、その場合、メッセージはインターネットとサーバーGTWとを

通って移動サービス交換センターMSCに行き、更にショートメッセージ・サービスセンターSMSCに行き、ここからそのメッセージは更に移動通信網を通して受け取り側の移動局MS2に送られる。

【0024】GSMシステムのショートメッセージ・サービスSMSによって、一度に最大で160文字の長さのメッセージを送ることが可能である。文字は7ビットのASCII（American National Standard Code for Information Interchange（情報交換用米国標準コード））文字であり、従って、ビットで表したメッセージの最大の長さは1、120ビット、即ち140バイトである。図3に示されているような普通の移動局は、小さなディスプレイと進歩したキーボードとを持っており、これによってショートメッセージを書くことができる、即ち、種々の文字や数字を入力することができる。図3に示されているように、受信されたメッセージは、文字や数字を表示することを可能にする移動局のディスプレイで表示される。

【0025】周知のように、GSMシステムでは伝送情報はいくつかのフレームに分割されている。送信されるべきメッセージの長さがフレームFRの許容される最大長さより長いときには、メッセージMは図4（A）に示されているように、部分M1-M4に分割されて（セグメント化されて）数個のフレームFR1-FR4で送られなければならない。受信時に、移動局は、図4（B）に示されているように、数個のフレームFR1-FR4に分割されているメッセージMを再構成する。無線インターフェース（図2）では、フレームの最大長さは通常は168又は184ビットであり、従って、ショートメッセージ（その最大長さは1、120ビットである）は数個のフレームに分割されなければならない。図5は、無線インターフェースで伝送されるフレーム、いわゆるLAPDmフレーム（Link Access Protocol for the Dm channel（Dmチャネル用リンクアクセス・プロトコル））を示しており、それは通常は3つのフィールドに分かれている。第1フィールドはアドレス・フィールドADDであり、これは、そのメッセージの宛先の、数個

のバイトで表されたアドレス（すなわち受信側の移動局識別子）を含んでいる。GSMシステムでは、シグナリングメッセージも、対応するLAPDmフレーム内で伝送される。無線通信では、同時に2つのメッセージの流れ（すなわちシグナリングメッセージ及びショートメッセージ）が互いに無関係に存在することがあり得る。その2つの異なる流れは、アドレス・フィールドADDに付加されるべきリンク識別子、即ちいわゆるSAPI

（Service Access Point Identifier（サービスアクセスポイント識別子））、によって互いに分離される。その値は、シグナリングを意味する3、又はショートメッセージを意味する0であることができる。第2フィールドは制御フィールドCTRLであり、このフィールドは送信フレーム番号N（S）及び受信フレーム番号N

（F）を含んでいる。第3フィールドは、実際の情報を包含するデータフィールドINFOであり、これは最大で168ビットの情報、即ち実際のショートメッセージの内容、を包含する。

【0026】各呼び出し音の伝送は特定の文字コード即ち識別子で特定されており、その場合には、受信側の移動局は、受信したメッセージを処理して、指定されているとおりの呼び出し音に直接変換することができる。その識別子はショートメッセージ伝送フレームの情報フィールド即ちフィールドINFO（図5）においてASCII文字で好ましくは表されており、このフィールドは文字で表された実際のショートメッセージを包含している。該識別子は、前もって合意された識別子又はその他の方法で作成される識別子であり、送信側の装置及び受信側の装置の双方がそれが呼び出し音を意味するものと知っている（例えば、ショートメッセージの冒頭の数列”120”）。呼び出し音はショートメッセージで送られるので、この種の呼び出し音プログラミング・サービスを支援しないけれどもショートメッセージを送受信することはできる普通の移動局でそれを受信することができる。呼び出し音識別子をフィールドINFOに置けば、この種の呼び出し音プログラミング・サービスを支援しないけれどもショートメッセージを送受信することはできる普通の移動局で呼び出し音識別子と文字で表された呼び出し音との両方がユーザーに対して表示されるという利点も得られる。また、この種の普通の移動局によって、始めに、問題の呼び出し音の識別子を文字でメッセージに書き込み、更に残りの情報即ち呼び出し音を文字で正しく分けて書き込むことによって、上記のメッセージのようなメッセージを送信することも可能である。その様な伝送情報を本発明の移動局で受信すれば、完全に受信された呼び出し音が作られる。

【0027】或いは、呼び出し音を包含するショートメッセージの識別子は、ショートメッセージのアドレス・フィールド又は制御フィールド（図5を参照）の特定のビットコードとして形成される。この場合にも、送信さ

れた呼び出し音は普通の移動局によって文字として受信されることができるとしても、その呼び出し音は呼び出し音メモリに記憶されることはできない。この場合、特定のコマンドで前記ビットコードを付加するように移動局を変更しなければ（さもないと普通の移動局は呼び出し音識別子を知らせることができないのだから）、ユーザーは、その他の部分は正しい文字を入力することはできても、この種の呼び出し音を普通の移動局によって送ることはできない。

【0028】呼び出し音識別子をショートメッセージの中の（データフィールド INFO の中の）文字コードして表示する代わりに、ショートメッセージのアドレスフィールド ADD 内で表示することができ、その場合には該識別子はビットで表される。ショートメッセージの伝送フレームのアドレスフィールドの中の特定のバイトは文字で表した音譜：

C, D, . . . , G, A, H
c, d, . . . , g, a, h

b

持続時間：

文字無し
—
+
.
..

【0031】長さ文字は累積的であってよい、例えば、単一の文字は常にそれに先行する文字の効果に寄与す
休止符：

；

【0032】音符の長さを修正する文字とともに休止符文字を使用して他の休止符を入力することができる。

【0033】上記のように、音符により作られる呼び出し音を、ショートメッセージで送ることのできる文字で符号化することができ、受信時には、受信された文字は処理されて、送信された呼び出し音に変換されることができ、それは呼び出し音メモリに記憶されて、電話が鳴るときに再生されることができる。従って、この方法は、呼び出し音をユーザーインターフェースを通して音符としてプログラムすることができ、或いは呼び出し音が音符として呼び出し音メモリに前もって記憶される装置に特に適している。

【0034】上記の仕様の他に、呼び出し音に関連する他の要素とその仕様とを例えば下記のように文字として指定することもできる：

:ACD:X ここで、Xは随意の数（整数）であり、音符列を ACD X回だけ反復させる、もし Xが無けれ

いわゆる TP-Data-Coding-Scheme（TP-データ符号化機構）であり、それは GSM 規格 GSM 03.40 及び 03.38 で指定されている。そのバイトの最下位 4 ビットを自由に使用することができるので、それらを使用して、本発明に従って、例えば、前記のバイト b 3 - b 0（この b 0 は該バイトの最下位のビットである）に 0 0 0 0 又はその他の合意された値を与えることによって、該ショートメッセージが呼び出し音を含んでいることを表示することができる。

【0029】呼び出し音がこの様に表示されるならば、それは、ショートメッセージの文字の長さ（最大で 160 文字）のために残されているスペースをとらない。

【0030】次のように、呼び出し音を文字に変換して、音符の形の文字としてショートメッセージに含めることができる。

低オクターブの A から G までの音符
高オクターブの A から G までの音符
先行する音符を半音上げる
（例えば、高い（high））
先行する音符を半音下げる
（例えば、鈍い（dull））

基本の長さ

先行する音符：基本長の半分

先行する音符：基本長の 2 倍

先行する音符：基本長の 1.5 倍

先行する音符：基本長の 1.75 倍

る。例えば、C + は、基本長の 3 倍を意味し、C - - - は基本長の 0.125 倍を意味する。

休止符；基本長と同じ長さ

休止符；基本長の半分の長さ

ば、2 回だけ。

/X ACD/ ここで、X は随意の数（整数）であり、例えば数 X で割ることにより、文字 “/” の中の音符の長さを短くする。この仕様では、三分の一音符は、“/3 ACD/” という符号で表される。

\$ 例えば、丸括弧の中の全ての音符についてシャープ又はフラット音符を入力し、その場合にはこれらの音符について文字 # 又は b を別に入力する必要はない。

(:) 反復を指定する、例えば、(5CD:2E:F) は CDE CDE CDE CDCD と演奏される。

! “スタッカート（staccato）” 音楽モードを例えば次の文字までスイッチオン／スイッチオフし、音符の長さを適当な割合だけ伸ばして休止の割合を小さくし、全体の時間を変えずに断片的スタイルを達成する。コンピュータシミュレーションでは、音符の長さを 50 - 60%、或いは 70% も長くしても、なお良く

響く。

?

分離音符機能を例えば次の文字までスイッチオン／スイッチオフし、音符の長さを最小時間だけ長くし、休止が音楽再生時間の残りの部分にわたって継続し、ここで、”流れ(flowing)”音楽モードとは違って、連続する2つの同じ音符は別々の音符として聞こえ、先行する音符は1つの音符として聞こえる。音符と音符の間の休止は同じ持続時間を持たなければならない。指定された休止より短い音符は、別々の音符とは聞こえない。コンピュータシミュレーションでは、約30ms続く音符間の休止は分離音符機能により良好に響く。

デフォルトオクターブ(a default octave)を上げる。もしデフォルトオクターブが1であれば、それを2に上げ、さもなければ1。

デフォルトオクターブを下げる。もしデフォルトオクターブが3ならば、それを2に下げ、さもなければ3。もし4オクターブが使用されると想定されるならば、上記のように、大文字及び小文字 C..H, c..h により同時に2オクターブを使用することができる。

X 後続する全ての音符 Xを1度(one degree)だけ上げる。ここで、Xは整数である。もしXが負の数であれば、下げる。

数(数だけ)(Number(alone)) テンポ、1分あたりのビート数、例えば、1分あたりの基本長の音符の数、を指定する。

空のスペースは無視される。

【0035】また、ユーザーインターフェースを通して呼び出し音に他のメッセージを結合させることができ、例えば：

* 電話が鳴っているときの点滅光一光をオン／オフに切替える。

【0036】次に、図6を参照して、本発明の移動局の構成と、呼び出し音をショートメッセージとして送受信する際のその動作とについて詳しく説明する。

【0037】図6に本発明の移動局の構成のブロック図が示されている。この移動局は好ましくは呼び出し音のプログラミングを可能にする回路及びユーザーインターフェースを有する移動局である。移動局1は、無線通信による通信のために、無線装置RU(図にはこの参照符号は記されていない)を有し、この通信装置は、普通の移動局から知られている送信部2(符号化、インタリーブ、暗号化、変調、及び送信を実行するブロックから成る)、受信部3(受信、復調、暗号解除、インタリーブ解除、及び実行ブロックから成る)、並びに、無線通信による送信を行うための、受信されたメッセージと送信されるメッセージとを区別する複式(デュプレックス)フィルター4、及びアンテナ5から成っている。該移動局は、その動作を制御する主制御回路6を有する。更

に、主制御回路6は更に、普通の移動局の制御機能を実行するRUコントローラ7を有する。また、移動局の主制御回路6は、本発明に従って呼び出し音をショートメッセージとして送信するためのブロック8-12を有する。従って、ブロック8-12は移動局のデータ処理装置DUを形成していると言うことができ、主制御回路(プロセッサ)6をプログラミングすることによって、それを完全に形成することもできる。無線装置RUと移動局のデータ処理装置DUとの制御部は主制御回路に統合されなくても良く、それらを互に別々に実現することもできて、RU制御回路7を無線装置の側に置き、データ処理装置の側にDUプロセッサ8を置くことが出来、このDUプロセッサ8は無線装置とデータ処理装置との間の通信を確立するためにRU制御回路7と接続される。

【0038】図6に示されている構成では、第1メモリー13が主制御回路6に結合されている。この第1メモリーは例えばRAM等の揮発性メモリーであって良く、これに主制御回路は使用中のデータを記憶させる。また、移動局は第2メモリー14を有し、これはパーマネントメモリー14であるのが好ましく、ショートメッセージ、呼び出し音、及びその他の、移動局の機能に欠くことのできないデータと、ユーザーが永続的に記憶させておきたい他のデータとが第2メモリー14に記憶される。或いは、移動局に結合されるインテリジェントカードのメモリー(ここから主制御回路6への接続がある)内にオフラインでショートメッセージを記憶させることもできる。この種のインテリジェントカードは、例えばGSM移動通信システムから、SIMカード(Subscriber Identity Module(加入者識別モジュール))として知られており、それは普通は、例えば電話番号などを記憶する記憶装置を持っている。

【0039】移動局のユーザーインターフェースは、ディスプレイ15と、データを入力するための、キーボード又はその他の例えばタッチディスプレイ等の入力装置16とから成る。

【0040】データ処理装置DUと無線装置RUとが機能に関して独立した装置として構成される場合には、それらは両方ともに共通の又は別々のメモリー13、14及びユーザーインターフェースUIを持つべきである。それらの装置間の通信は、DUプロセッサ8とRU制御回路7との接続によって確立され、それはこの関係では外付け制御インターフェースECIと呼ばれる。

【0041】次に、呼び出し音を送信するときの移動局の動作について説明する。ユーザーインターフェースUIにより、所望の呼び出し音がメモリーから検索されるが、その場合には、入力装置からの16種類のコマンドに基づいて、制御回路7は呼び出し音をメモリー14から検索する。ユーザーが入力装置によって呼び出し音を送るコマンドを入力するとき、DUプロセッサ8は呼び

出し音から文字列を作成するが、該プロセッサは、その文字列の冒頭に例えば数列”120”などの呼び出し音識別子を置き（該識別子がアドレスフィールドで表示されない場合）、次に呼び出し音を例えば上記のASCII文字等の文字に変換し、その文字を該識別子の後に置く。上記のように、ショートメッセージは空中を経由してビットで、即ちフレームの中の2進文字として、送られる。DUプロセッサ8はASCII文字を2進文字に変換する。この変換を実行する1つの方法について後に説明する。従って、DUプロセッサ8は、文字の処理を行う文字変換機能を有し、それはプログラマブルに実現されてメモリ14に記憶されており、これからDUプロセッサ8はそのプログラムを検索して、そのプログラムに従って該機能を実行する。DUプロセッサ8は、作成した文字列をSMS送信コントローラ10に転送し、このコントローラはそのメッセージにアドレス情報を、即ち宛先に関する情報を、ユーザーが入力した情報に基づいて付け加える。従って、この種のSMS送信コントローラは一種のビット及び／又は文字発生器である。呼び出し音を文字に変換する機能は好ましくはアプリケーションプログラムとして実現されてメモリ14に記憶され、それをDUプロセッサ8が使用する。

【0042】アドレス情報がSMS送信コントローラ10で付加されると、そのメッセージはアウトボックス11に転送され、これはそのメッセージを送ろうと試みるものであって、バッファを持っており、もし送信が失敗したらその中に該メッセージが記憶される。もし送信が失敗したら、アウトボックス11はメッセージを送り直す試みをする。無線装置RUがメッセージを送れる状態になっていることにDUコントローラ8が気付くと、そのメッセージはメッセージ転送操作回路（message transfer running circuit）12に転送され、この回路12は、妥当性情報（validity information）（これは、そのメッセージがどの方向に進むのか、即ち移動局からメッセージサービスセンターに進むのか、或いはその逆に進むのかを示す）等の、問題の移動通信システムに関連する情報をそのメッセージに付加し、アドレス情報を移動通信システムが要求する形に変換処理し、該メッセージにメッセージサービスセンターのアドレスとショートメッセージ識別子（SAPI）を付加し、送信されるべき情報から例えば送信装置2のためのデジタル信号を形成し、該メッセージを無線装置RUの無線送信部2に送る。呼び出し音識別子がアドレスフィールドADDのビットに置かれる場合には、操作回路12は該メッセージに問題の識別子を付加する。送信部2は、信号を移動通信システムの仕様（規格）に従って符号化し、該送信部が操作回路12から受け取った信号に基づいて送信されるべきフレームを作成し、該フレームを送信装置は無線通信によりショートメッセージ・サービスセンターMSMに送り、ここから該フレームは更に受信装置

（図1を参照）に送られる。送信部2において、メッセージは移動通信システムに従って、例えば符号化、インタリーブ、暗号化、バースト形成、変調、及び送信等の処理を受ける。

【0043】ブロック8、10-12の動作は、例えばインターネットを通してショートメッセージ・サービスセンターに接続されるPCによって実行されることもできる。操作8、10-12はコンピュータの処理装置によってプログラマブルに実行されてもよく、種々の呼び出し音をコンピュータのメモリに記憶させることができる。その場合には、ブロック12は当然にコンピュータの出力ポート又はモデムに結合され、そこからインターネットに接触することができると仮定することができ、従って、メッセージをショートメッセージ・サービスセンターに送ることができ、該ショートメッセージ・サービスセンターはショートメッセージを図2に示されているように受信側の移動局に送信する。

【0044】次に、呼び出し音をショートメッセージとして受信する際の移動局の動作について説明する。コミュニケータが呼び出し音をショートメッセージとして受信するとき、そのメッセージは始めに無線装置RUに到達する。そこで、受信部3で、移動通信システムに従って受信、復調、暗号解除、インタリーブ解除、及び復号等の処理がそのメッセージに対して行われる。受信されたフレーム識別子（SAPI）がそのメッセージがショートメッセージであることを示しているならば、それはデータ処理装置の宛先ボックス9に転送されるが、これはメッセージを記憶するメモリであることができる。受信されたショートメッセージは、SIMカードに置かれているメモリに、或いは移動局のパーマネントメモリ14に記憶されることができる。受信されたメッセージが普通のショートメッセージであるならば、DUプロセッサ8は、受信されたショートメッセージを伝える。もしそのメッセージが呼び出し音であることを示す識別子をそのメッセージが持っているならば、DUプロセッサ8は、2進文字をASCII文字に変換し、更にそのASCII文字を呼び出し音に変換して、その呼び出し音をパーマネントメモリ14に記憶させる。或いは、受信された呼び出し音を受け入れるか否か、即ちそれをパーマネントメモリに記憶させるか否かをユーザーに先ず尋ねるようにもできることを当業者は理解するであろう。また、受信されたシーケンスにエラーがあるか否かをDUプロセッサが検査するように、エラー検査を変換操作に付加することもできる。エラーがなければ、その呼び出し音シーケンスは呼び出し音として呼び出し音メモリ14に記憶されるが、その場合にはショートメッセージの受信は受信された呼び出し音としてユーザーに対して表示される。エラーがある場合には、その呼び出し音シーケンスは呼び出し音メモリに記憶されないで、普通のショートメッセージとしてショートメッセー

ジメモリー 1 4 に記憶されるだけである。呼び出し音が首尾良く受信されると、DU プロセッサ 8 は、呼び出し音をプログラミングして呼び出し音を音符としてディスプレイ 1 5 で表示するアプリケーションを立ち上げることができる（もし移動局がその様なアプリケーションを持っていれば）。

【0045】次に、ASCII 文字を 2 進文字に変換する 1 つの方法について説明する。ASCII 文字を 1 6

ASCII 文字: C a l l i n g

1 6 進数の形: 43 61 6C 6C 69 6E 67

2 進数の形: 0100 0011 0110 0001 0110 1100 0110 1100 0110

1001 0110 1110 0110 0111

【0046】実際の送信では、文字はスペース無しで、即ち連続するビット列として、次々に送られる。従って、各 ASCII 文字について、特定の 1 6 進数形及び 2 進数形があり、この場合には ASCII 文字によって音符を指定するために上に示した例を 2 進数の文字に変換することができる。

【0047】音符の指定が 2 進数の形の呼び出し音メッセージに変換されると、それを赤外線リンクによる赤外線信号で或いは USSD で容易に送ることができ、その場合、それを SMS の場合と同じく文字として送ることもできる。周知のように、移動局に、赤外線信号を送受信するために赤外線リンクを設けることが可能である。従って、無線部分 2 - 5 の他に、移動局は、図 6 に示されているように、同様に主制御回路 6 に接続された赤外線送信装置及び赤外線受信装置を持つことができる。呼び出し音を USSD で送るために、送信ブロック 2 及び受信ブロック 3 に必要な修正を施すことができる。

【0048】呼び出し音を文字として送るもう一つの方法は、始めにそれを MIDI (Musical Instrument Data Interface (楽器データインターフェース)) 形に変換するが、これは楽器用の周知の通信言語である。移動局に MIDI 変換器を設けることによって、これを実行することができる。MIDI 変換器は好ましくは DU プロセッサ 8 に置かれ、この場合 DU プロセッサ 8 は、受信時に、MIDI で受信した文字を電話機の呼び出し音発生器及びメモリーに適する形に変換する。同様に、送信時には、MIDI 変換器は、呼び出し音を MIDI 形に応じて文字に変換する。MIDI 変換器は、例えば MIDI 形を支援するコンピュータにもとづく作曲プログラム (composition programs) によって呼び出し音作曲し、作られたメロディーをコンピュータから移動局へ例えばショートメッセージで送ることを可能にするものである。

【0049】次に、ユーザーインターフェースによって呼び出し音をプログラミングするための上記のアプリケーションを実現する一つの実例としての方法、即ち、電話機で呼び出し音を音符としてプログラミングする 1 つの方法を、図 7 (B) を参照して説明する。この例で

進数として表示することができ、それを更に容易に 2 進数に変換することができる。次に、"Calling" という単語がどの様に 2 進数に変換されるか説明する。以下の記述では、スペースで分離された 2 つの 1 6 進数は ASCII 文字に対応し、その各々の 1 6 進数の文字を 4 ビットで表すことができる、即ち、以下のように、各 ASCII 文字が 8 ビットで表される。

は、楽譜 (stave) が移動局のディスプレイ 1 5 上に作られ、ディスプレイに表示されたメニュー及びキー 3 0 a 及び 3 0 b によって、所望の音符を選択して、キーにより動かされるカーソルによって、ディスプレイに表示されている楽譜の所望の場所にその選択した音符を置くことができる。図 7 (B) に示されているディスプレイを移動局において大型のディスプレイで実現することができ、或いは、同じく、図形の楽譜を普通の移動局のサイズのディスプレイ上に、例えばマトリックス型の液晶表示装置上に実現することができる。

【0050】この例では、キーを通してディスプレイ上に表示されるメニューから所望の音部記号 (clef) を選択することができるとともに、常にカーソルによって指示された場所に音符を置くことが出来、その持続時間及び音高 (pitch) (即ち、楽譜 (stave) 上での位置) をキー 3 0 a 及び 3 0 b、並びにメニューによって変更することができる。例えば、音符の持続時間を修正するためには、キー 3 0 b を通して持続時間メニューにアクセスし、走査検索キー 3 0 a を通して、八分の一音符 (eighth note)、四分の一音符 (quarter note)、半音符、全音符を、或いは八分の一休符、四分の一休符、半休符、全休符を楽譜上で選択することができる。これらの音符が図 7 (A) に示されている。同様に、音符の音高 (その音符の楽譜上での垂直方向の位置) を修正するためには、走査検索キー (browse key) 3 0 a を 1 方向に (該キーが上方を指す) 押すことによって楽譜上での音符の位置を上げることができ、また、走査検索キー 3 0 a を他の方向に (該キーが下方を指す) 押すことによって楽譜上での音符の位置を下げるができる。この様に、例えば、休止符、c, d, e, f, g, a, h, c¹, d¹, e¹, f¹, g¹, a¹, h¹, c², d², e², f², g², a², 或いは h² などの、希望するどの様な音符でも作ることができる。走査検索キー 3 0 a を通してシャープ (c^{is}, d^{is}, e^{is}, f^{is}, g^{is}, a^{is}, h^{is}, c^{is1}, d^{is1}, ..., c^{is2}, d^{is2}, ..., h^{is2}) 及びフラット (c^{es}, d^{es}, e^{es}, f^{es}, g^{es}, a^{es}, b, c^{es1}, d^{es1}, ..., c^{es}

$^{\flat}$, $d e s^{\sharp}$, \dots , b^{\sharp}) の音符を作ることでもでき、その場合、ディスプレイ上で、音符の前にシャープ音符又はフラット音符を示す記号が作られるが、それも図 7 (A) に示されている。この様にして、例えばメロディーが最大で 60 個の連続する音符を持つこととなるように楽譜上で所望の音符及び休止符を順に作ることができる。メロディー作成モードとなっている移動局のディスプレイの例が図 7 (B) に示されており、この図は楽譜、音部記号、いろいろな音符、及びカーソル (矢印) を示しており、それは音符の場所を指示し、その長さ (持続時間) 及び音高を上記の音符を選択するときと同様に変更することができる。図 7 (B) に示されている楽譜上で、左から 3 番目の音符と 4 番目の音符とはシャープ (上がった) 音符の例である。

【0051】楽譜上でキー及びメニューによって音 (tones) を作る代案として、音符をディスプレイ上にアイコン (icons) として表示し、いわゆるスピンホイールやトラックボール (track ball) で動かされるポインタによって該アイコンをドラッグ (drag) して楽譜上の所望の場所にリリースする (即ち、置く) ことができる。タッチディスプレイを使えばスピンホイールやトラックボールを使わなくてもよく、その場合には問題のアイコンを指やペンで楽譜上に置くことができる。

【0052】また、ユーザーインターフェースによって例えば 1 分間あたりのビート数 $b p m$ などテンポを設定することができ、作成された呼び出し音 (楽譜上に書かれたメロディー) がそのテンポで再生される。この場合、ミリ秒単位で表した四分の一音符の長さは $t = 1000 (60 / t e m p o)$ であり、この場合、もしテンポが $150 b p m$ であれば、四分の一音符 (fourth note) の長さは $400 m s$ 又は 0.4 秒となる。このテンポを、例えば $50 \dots 999 b p m$ の間の数で設定することができる。テンポは好ましくはメニューからテンポ・コマンドを選択することによって設定され、その場合、キーを通して所望のテンポをディスプレイ上に入力することができる。

【0053】別の方法として、音符を文字記号としてディスプレイ上に表示し且つ/又は、12 個のキー (キー 0-9、* 及び #) を有する電話機の普通のキーボードを通してプログラムすることもできる。この場合、特定のキーを通して、又は 2 つのキーの組み合わせとして、各音 (音符又は休止符) を作ることができる。この場合、1 つ又は 2 つのキーを押すことは特定の音に対応し、前述のように、それに対応する音符を該キーを押す動作に対する応答として移動局のディスプレイ上に (文字記号として、或いは楽譜上の音符として) 表示することができ、或いは、キーを押す動作に対する応答として移動局のスピーカーを通してその音を再生することもでき、その場合にはユーザーはそれを聞くことができる。キーを押す動作の持続時間は、或いは、押す動作が 2 回

続けて実行される場合には例えば後者の押す動作の持続時間は、その音の長さに比例する。また、例えば、ショートメッセージのために呼び出し音を変換することについて前述したのと同様の方法で、ユーザーインターフェースを通して文字を入力することによって呼び出し音のプログラミングを実行することができる。

【0054】次に、図 6 を参照して、電話機で呼び出し音を作成する方法について解説する。中央装置 6 は、ショートメッセージで (或いは、前述の方法に従って、キーボード 16 及び/又はディスプレイ 15 から成るユーザーインターフェース UI から)、ユーザーにより選択された音 (音符) を受け取り、それが完全なメロディーとしてメモリー 14 に記憶される。呼が入ってくるとき、移動通信システムの規格に従って、始めに基地局からのメッセージが移動局に到着する。このメッセージは移動局のアンテナ 5 から受信装置 3 に受信され、そこから該メッセージは中央装置 6 に到達する。これにตอบสนองして、中央装置 6 は音響発生器 17 に制御信号 19 を与える。その制御信号に基づいて、音響発生器 17 は呼び出し音を発するが、それは、音符により指定されたメロディーに基づく特定の周波数を有する音の系列である。中央装置 6 は、メモリー 14 に記憶されている呼び出し音を該メモリー 14 から読み出すことによって制御信号を作る。従って、制御信号 19 は、呼び出し音再生装置 20 のために音響発生器 17 が作るべき呼び出し音の種類を指定する音響発生器 17 のための情報を含んでおり、この装置 20 は、ブザー、スピーカー或いはその他の、電気信号を音に変換するための変換器である。ユーザーが応答キーを押すことによって電話機に応答すると、ユーザーインターフェース UI は信号を中央装置 6 に与え、該装置は、キーを押す動作に対する応答として、音響発生器に呼び出し音制御信号 19 を与えるのをやめ、これで呼び出し音が止む。

【0055】音響発生器 17 として、例えば、SGS-Thomson によって製造されている市販の符号復号器 Codec ST5090 回路を使用することができるが、それは、 $15.6 H z \dots 3,984 H z$ の間の $15.6 H z$ 間隔での音を、即ち各々周波数の異なる 256 個の音を作ることのできる音響発生器を含んでいる。音の周波数は、 $0-256$ の間の数を表す 8 ビット信号に基づいて作られるが、その場合、制御信号の数 1 は音響発生器のステップ 1 に、即ち、 $15.6 H z$ の周波数に対応し、同様に、数 2 は $31.2 H z$ の周波数に対応する、等々である。従って、上記の音を、例えば下記の周波数 (必ずしも正確な値ではなくて、桁が示されている) で、音響発生器にもたらされる下記の制御信号 (バイト) によって、音響として再生することができ、そのうちの幾つかについては以下の記述で説明するが、残りは当業者により前述の原理に従って決定され得るものである。

【0056】 $a = 880\text{Hz}$ は音響発生器のステップ6即ち制御バイト'00111000'に対応し(より正確には、 $56 \times 15.6\text{Hz} = 873.6\text{Hz}$)、 $a_i s = 932\text{Hz}$ 、 $b = 988\text{Hz}$ は音響発生器のステップ63即ち制御バイト'00111111'に対応し(より正確には $63 \times 15.6\text{Hz} = 982.8\text{Hz}$)、 $c^1 = 1, 047\text{Hz}$ 、 $c_i s^1 = 1, 109\text{Hz}$ 、 $d^1 = 1, 175\text{Hz}$ 、 $d_i s^1 = 1, 245\text{Hz}$ 、 $e^1 = 1, 319\text{Hz}$ 、 $f^1 = 1, 397\text{Hz}$ 、 $f_i s^1 = 1, 480\text{Hz}$ 、 $g^1 = 1, 568\text{Hz}$ 、 $a^1 = 1, 760\text{Hz}$ 、 $a_i s^1 = 1, 865\text{Hz}$ 、 $h^1 = 1, 976\text{Hz}$ 、 $c^2 = 2, 093\text{Hz}$ 、 $c_i s^2 = 2, 217\text{Hz}$ 、 $d^2 = 2, 349\text{Hz}$ 、 $d_i s^2 = 2, 489\text{Hz}$ 、 $e^2 = 2, 637\text{Hz}$ 、 $f^2 = 2, 793\text{Hz}$ 、 $f_i s^2 = 2, 960\text{Hz}$ 、 $g^2 = 3, 136\text{Hz}$ 、 $g_i s^2 = 3, 322\text{Hz}$ 及び $a^2 = 3, 520\text{Hz}$ は音響発生器のステップ226即ち制御バイト'11100010'に対応する(より正確には、 $226 \times 15.6\text{Hz} = 3, 525.6\text{Hz}$)。

【0057】各音 $c - a^2$ と、それらの高められた音及び低くされた音とに対応する周波数は好ましくは移動局において予め定められ(或いは、少なくとも、呼び出し音を作るのに必要な音)、例えば、メモリー14に記憶されている。作られるべき各々の音(tone又はsound)について1バイトがメモリー14に記憶され、その場合、もしメロディーが60個の音から成っているならば、60バイトが該メモリーに記憶される。中央装置6は、それらのバイトをメモリー14(12)から検索して、そのメロディーを呼び出し音として再生するために音響発生器17を制御する。前記の公知の符復号(コーデック)回路はクロック入力と内部クロック信号発生器も持っており、それは、図6では、特定のクロックテンポに従って音響発生器17の動作を制御するオフライン・クロック発生器18として図示されている。音響発生器のテンポを例えば150bpmに設定するように、このクロックテンポを固定することができる。テンポをショートメッセージで指定することもでき、またユーザーインターフェースを通して変更することもできる。設定されたテンポはメモリー14に記憶され、音響発生器17は、該音響発生器がクロック発生器18から受け取る信号に基づいて設定されたテンポで音を発するように制御される。

【0058】中央装置6は、文字(即ちユーザーインターフェースUIを通して作られた文字)又はキーを押す動作を識別し、それらを該文字又はそのキーを押す動作に対応する周波数に処理して、その周波数に対応する信号をメモリー14に記憶させ、呼び出し音が再生されるときにそれが音響発生器17にもたらされる。

【0059】音響再生装置20のための制御信号を作る他の方法は、音響発生器として、カウンタ例えば、6

5, 535から0までカウントダウンする16ビットのカウンタを使用することである。音響を再生するとき、そのカウンタは、所定の数字からカウントダウンするように動作可能に(リリース)される。カウンタが0に到達したとき、パルスが生成され、該カウンタが所定の数字から再びカウントダウンし始める。音響は数個のパルスから成る。カウンタは65, 535から0まで1/18秒間でカウントし、その場合、18Hzに相当するパルス波が作られる。この場合、もし4, 096が所定の数字としてカウンタに与えられるとすると(この場合、カウンタは4, 096から0までカウントする)、 $(65, 535 / 4, 096) \times 18 = 288\text{Hz}$ の周波数を有するパルス波が作られる。この様にして、18Hz-1.18MHzの間のいろいろな周波数を有するパルス波を作ることができる。この様にして作ったパルス波を、そのパルス波に従って振動するブザー等の音響再生装置に入力されるべきパルス幅変調として使用することができる。

【0060】周知のように、ユーザーは、電話機が鳴るときに再生させたい、呼び出し音メモリーに記憶されている呼び出し音を、現在の電話機からユーザーインターフェースを通して選択することができる。

【0061】本発明は、新しい呼び出し音を電話機から速やかに且つ簡単に入手することを可能にするものである。ユーザーは、ユーザーインターフェースを通して呼び出し音をプログラムしたり、呼び出し音を電子的にロードするサービス店に電話機を持って行ったりする必要はない。電話機の呼び出し音メモリーを準備する必要もなく、呼び出し音を無線通信で直接受信することができる。また、ユーザーは自分で第2の移動局に呼び出し音を送ることができる。更に、例えばインターネットを通してショートメッセージ・サービスセンターと接続しているコンピュータから呼び出し音をショートメッセージで移動局に送ることもできる。

【0062】本明細書は本発明の構成及び実施例を例をあげて説明している。本発明が前述の実施例の細目に限定されるものでないこと、また、本発明の特徴から逸脱することなく本発明を別の形で実施し得ることは当業者にとっては明らかなことである。開示した実施例は説明を目的とするものであつて、限定をするものと解されてはならない。従って、本発明を実施し使用する可能性は特許請求の範囲のみによって限定される。従って、各請求項により定義される、均等物も含む、発明を実施するいろいろな選択肢も本発明の範囲内のものである。

【図面の簡単な説明】

【図1】移動局から第2の移動局へのショートメッセージの流れを示す図である。

【図2】移動通信システムからショートメッセージ・サービスセンターへの接続を示す図である。

【図3】普通の移動局のユーザーインターフェースを示

す図である。

【図4】(A)は、送信時のメッセージのフレームへのセグメント化を示す図であり、(B)は、受信時のメッセージの再構成を示す図である。

【図5】ショートメッセージ・フレームの構造を示す図である。

【図6】呼び出し音を送信し、ショートメッセージを受信するときの本発明の移動局の構成及び動作を示す図である。

【図7】(A)は、本発明の移動局のディスプレイ上で 10 呈示される音符を示す図であり、(B)は、呼び出し音を作るための移動局のディスプレイの例を示す図である。

【符号の説明】

MS…移動局

2 (TX) …送信部

3 (RX) …受信部

7…RU制御回路

8…DUプロセッサ

10…SMS送信コントローラ

12…メッセージ転送操作回路

13…第1メモリ

14…第2メモリ (呼び出し音メモリ)

15…ディスプレイ

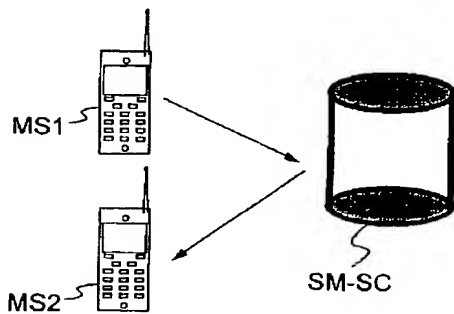
16…キーボード

17…音響発生器

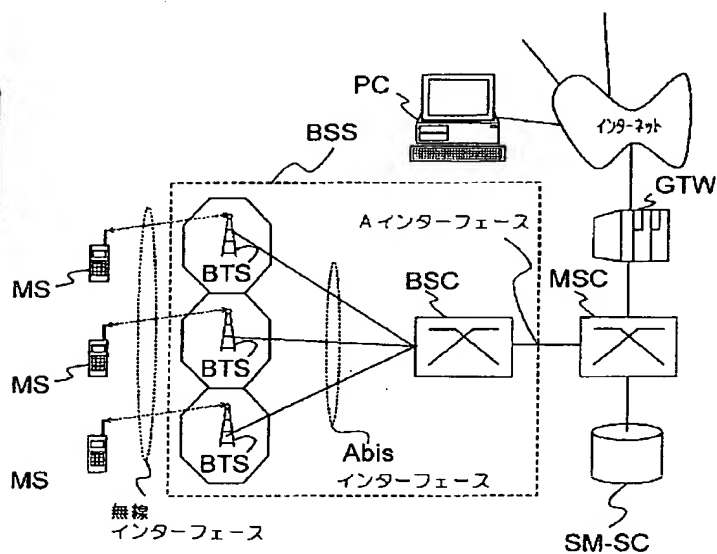
20…音響再生装置

UI…ユーザーインターフェース

【図1】

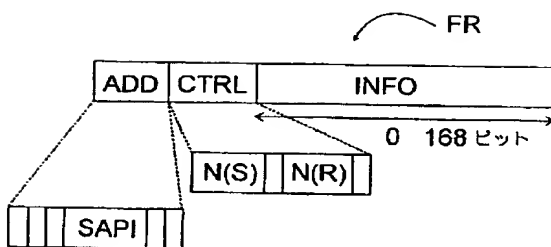


【図2】

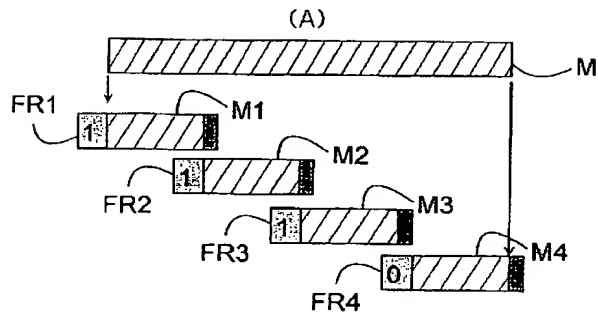


【図3】

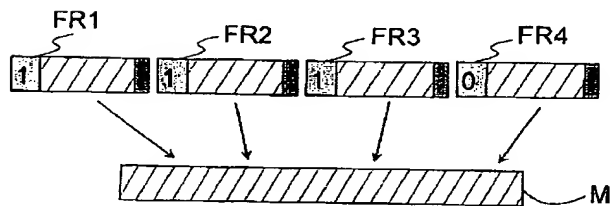
【図5】



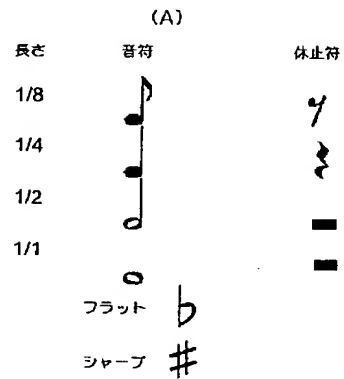
【図 4】



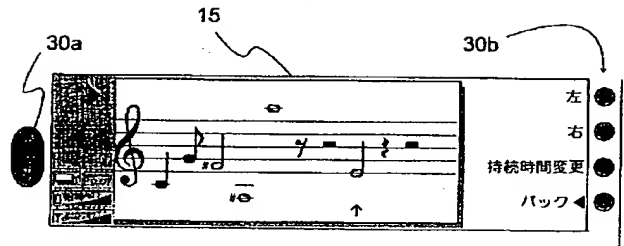
(B)



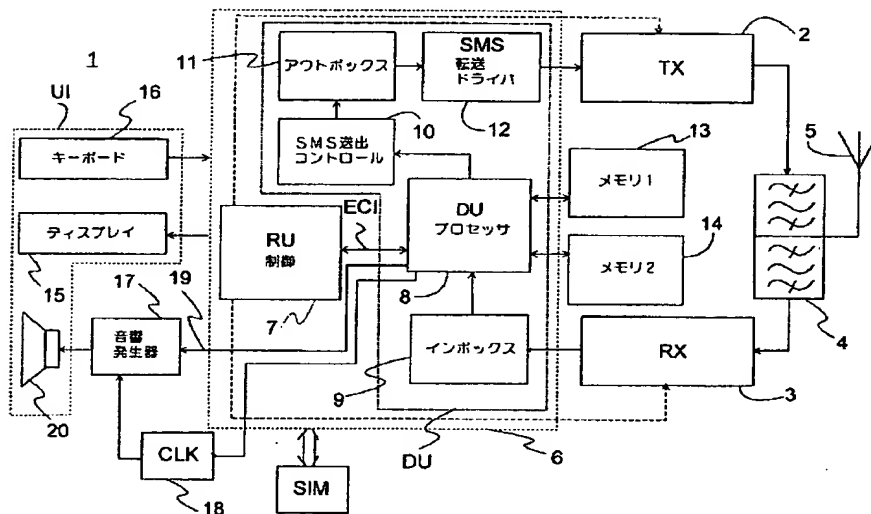
【図 7】



(B)



【図 6】



フロントページの続き

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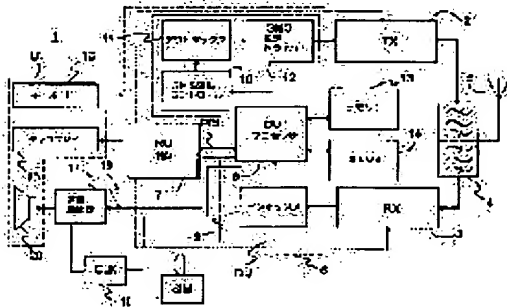
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(54) MOBILE COMMUNICATION SYSTEM, MOBILE STATION AND METHOD FOR PROGRAMMING CALL TONE OF TELEPHONE SET

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a method for programming a call tone of a telephone set.

SOLUTION: A call tone is stored in a call tone memory 14 in a telephone set by this method and is reproduced as a response to an incoming call by an acoustic reproducing device 20. The call tone in this method is converted into characters including specifications of notes and the characters are sent to the telephone set in a form of, e.g. a short message. The characters received by the telephone set are converted into a form that can be stored in the memory.



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CLAIMS

[Claim(s)]

[Claim 1] In the migration communication system which consists of a mobil radio communication network and at least one mobile station for radio (MS) The means (TX, RX) for transmitting and receiving voice, and the memory which memorizes a call sound (14), The means for having a means (20) for entering and reproducing the call sound as a signal of a call, changing into an alphabetic character the call sound memorized by this memory (14), and sending this alphabetic character (8 10-12), Migration communication system characterized by having a means (8) for sending with the call sound discrimination child who specifies said alphabetic character as the transmission information calls and it is sound transmission information.

[Claim 2] In the migration communication system which consists of a mobil radio communication network and at least one mobile station for radio (MS) The means (TX, RX) for transmitting and receiving voice, and the call sound memory which memorizes a call sound (14), The means for having a means (20) for entering and reproducing the call sound as a signal of a call, and receiving the message accompanied by an alphabetic character (9), The means for detecting the call sound discrimination child who the message in the received message calls and tells that it is a sound (8), Migration communication system characterized by having a means for receiving a call sound as an alphabetic character, and a means (8) for changing said alphabetic character into the form memorized by this call sound memory (14).

[Claim 3] In the mobile station for radio (MS) which has a means (TX, RX) for transmitting and receiving voice, and the call sound memory (14) which memorizes a call sound and the means (20) for entering and reproducing the call sound as a signal of a call The means for changing into an alphabetic character the call sound memorized by this memory (14), and transmitting this alphabetic character (8 10-12), The mobile station characterized by having a means (8) for sending with the call sound discrimination child who specifies said alphabetic character as the transmission information calls and it is sound transmission information.

[Claim 4] In the mobile station for radio (MS) which has a means (TX, RX) for transmitting and receiving voice, and the call sound memory (14) which memorizes a call sound and the means (20) for entering and reproducing the call sound as a signal of a call The means for detecting the call sound discrimination child who the means (9) for receiving the message accompanied by an alphabetic character and its message in the received message call, and tells that it is a sound (8), The mobile station characterized by having a means for receiving a call sound as an alphabetic character, and a means (8) for changing said alphabetic character into the form memorized by this call sound memory (14).

[Claim 5] The approach characterized by to send to this telephone as an alphabetic character with the call sound discrimination child who specifies that memory (14) is made to memorize a call sound and it enters with a sound reproduction means (20) in the approach of programming the call sound of telephone, and it reproduces as a response to a call, a call sound is changed into an alphabetic character, the transmission information is called, and it is sound transmission information.

[Claim 6] The approach according to claim 5 characterized by calling as an alphabetic character including assignment of a note, and sending a sound to telephone.

[Claim 7] The approach according to claim 5 characterized by receiving a call sound as an

alphabetic character and changing the alphabetic character into the form which may be memorized by memory when receiving a message and detecting the call sound discrimination child in the message in telephone.

[Claim 8] The approach according to claim 5 characterized by sending this alphabetic character by the short message.

[Claim 9] The call sound memory this terminal unit remembers a call sound to be in the terminal unit for data transmission (14), The means for having a means for transmitting the call sound, changing this call sound into an alphabetic character, and sending this alphabetic character (8 10-12), The terminal unit characterized by having a means (8) for sending with the call sound discrimination child who specifies said alphabetic character as the transmission information calls and it is sound transmission information.

[Claim 10] The terminal unit according to claim 9 characterized by having a means for establishing connection with the short message service pin center, large of migration communication system, and a means (8 10-12) for transmitting said alphabetic character by the short message through this short message service pin center, large (SM-SC).

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is called in telephone by this approach about the approach of programming the call sound of telephone, and a sound is memorized by call sound memory and reproduced by the sound playback means as a response to an entering call. This invention consists of at least one mobile station of the for a mobil radio communication network and for radio in this system also about a mobile station and migration communication system, and this system has the memory which remembers a call sound to be a means for transmitting and receiving voice, and a means for reproducing the call sound as a signal of an entering call.

[0002]

[Description of the Prior Art] A mobile phone is called like ordinary telephone from the first, and has a sound, and it resembles in general the sound in which a clock rings. The situation that the specific mold and the mobile phone of a model were troubled when [one / at which it was decided] it called and had only a sound arises. When two users who are present in the same location have the mobile phone which emits the same type, therefore the call sound of the same class, the telephone which is sounding truly understands in that [whose] and is confusing. This problem is solved by making it depend for a call sound on a user's own telephone number or a calling party's telephone number. However, since the call sound emitted based on the two almost same telephone numbers is very well alike and can be heard, it is difficult to distinguish one call sound from other call sounds. Moreover, although the call sound effectiveness that tones mainly differ by calling based on the telephone number and making a sound is attained, it may irritate a user, namely, a user cannot call so that liking of it may be suited, and cannot choose a sound.

[0003] A mobile phone takes this problem for progressing, and it is solved further. Some kinds of call sounds are usually beforehand memorized by current and the mobile phone, and a user can choose a favorite call sound now out of it. The melody in the music work loved widely calls, the latest technology other than an ordinary call sound is realized as a sound, and it has a call sound which can also choose them. While a mobile phone comes to be used very widely and

other someone's telephone was sounding, it turned out that the user of how many person thing mobile phone is inadequate even if the call sound of a mobile phone has no less than ten kinds in order to solve the problem which thinks that its own telephone is sounding. Moreover, that neither goes into a user's mind may also occur [of the call sound memorized beforehand]. By ordinary telephone only with the call sound of the limited class, the same problem often occurs. [0004] Such a situation is improved by calling with the user interface of telephone or other communication devices, and enabling it to program a sound. One solution is indicated by U.S. Pat. No. 4866766, and according to the solution, a user can input into telephone the various parameters which define call sound sequences of a pulse form, such as the number of the number of the pulses in a frequency, pulse duration, and a group, the time amount between pulses, and the groups of a pulse. These parameters are inputted as various numbers. The call sound of a paging device is programmable by other solutions' being indicated by the official report WO 92/03891, and switching the specific pixel on a matrix display to ON with the solution, or illuminating it. The location of the perpendicular direction of a pixel corresponds to the specific pitch (pitch) of a note (E, F, G, A, H, C, D), and the persistence time of a note is determined according to a continuous pixel. The solution to which others correspond is indicated by the official report EP 684591A1, and with the solution, it is possible to call on the display of a paging device and to program a sound, and the pitch of a note can be displayed as a literal notation (DO, RE, MI, FA, SO, LA, TI) on a display, and can change the persistence time of a note now as a sequence of some same literal notations. Since it calls to the above-mentioned solution and there is a fault about programming of a sound, it is possible for a certain solution to be indicated by the Finland patent application 960858 for which it applied on February 23, 1996, to call by inputting a note in the form of the note of a graphic form directly in the solution on the score displayed on the display, for example, and to program a sound as a note.

[0005] However, programming of the call sound which leads a user interface has a fault. A user has to take a troublesome procedure of inputting various parameters, alphabetic characters, or notes by various approaches. Moreover, in many of above-mentioned examples, the user is assumed to have the knowledge of music theory, in order to make a specific melody by his own telephone.

[0006] The solution for making programming of a call sound easy is indicated by U.S. Pat. No. 4868561, and the owner of a paging device can obtain the new call sound for the paging device via the air with the solution. It is attained as follows, i.e., the owner of a paging device tells the identifier (telephone number) of this paging device, telephoning the operator of a paging system, and it chooses the call sound of hope from the catalog which he already has, and tells the operator of a paging system about the identifier of the call sound. In this case, by calling a paging sending set first and sending a sound modification message to a paging device, call to a paging device, sound modification is made to prepare, and it replaces with the new call sound sequence a paging sending set has a call sound sequence remembered by delivery, and the paging device was remembered to be by memory and which received the sound sequence via the air by calling after that.

[0007] With the above-mentioned solution for programming a call sound, there is a fault that the call sound in which the user needed to contact the paging sending set treating various call sounds separately, the user appears in the paging sending set and a user's catalog, therefore he knows the identifier can come to hand. Moreover, since it is maintained as a channel is busy, when the call sound sequence is transmitted, as for a paging device, a paging message is unreceivable to coincidence in the meantime. Similarly, only the operator of a paging system can perform

programming, namely, there is a fault that a call sound sequence can be transmitted via the air. Furthermore, a paging device (the call sound memory) must be called first, must prepare towards sound modification, and requires the additional transmission for it.

[0008]

[Problem(s) to be Solved by the Invention] Other solutions relevant to sending an audio via the air are indicated by the official report WO 96/06417, and this is indicating the paging system which can include a musical piece sound (audio composition) in the paging message by which a sending set is sent to a pager. While message data will be expressed as a display when the usual alarm tone is emitted and a user reads that message if a pager receives that message, informational power of expression is heightened by the musical piece sound contained in that message being reproduced by the audio converter, carrying out in this way, and mixing acoustic-sense information and vision information. However, this official report has not proposed programming of an alarm tone, i.e., the call sound of a pager.

[0009]

[Means for Solving the Problem] This invention consists of call sound programming equipment which enlarges possibility of programming a call sound, and an approach for it. By the approach, a call sound calls the message, when it is sent to a mobile station and received in the form of the call sound message containing the identifier specified as it is a sound, the call sound message is specified based on a call sound discrimination child, and this message is corrected to the form of being suitable for a call sound generator and memory, after that. A call sound is preferably transmitted by radio. In this case, a call sound can be sent to a direct receiving set, without making it prepare for the call sound which calls first and enters sound memory without prior announcement. It can let a voice channel pass or a call sound can be sent as a mobile data message apart from a voice channel. It is USSD (Unstructured Supplementary Service Data) different from a voice channel (non-structured auxiliary service data), or a call sound can be sent as an alphabetic character of a short message by the off-line infrared link of an IrDa mold. USSD -- GSM specification -- setting -- for example, -- It is the document of TS GSM 02.04, TS GSM 02.30, TS GSM 02.90, TS GSM 03.38, TS GSM 03.40, etc., and is specified in detail. The mobile station of this invention has a means for [which detected the call sound discrimination child in a message, and was received] calling, calling a sound message and correcting for a sound generator and call sound memory. The mobile station of this invention can have a means for correcting so that the call sound memorized by call sound memory can be sent to the 2nd mobile station. A mobile station has a means for adding a call sound discrimination child to a message for transmission. A call sound is preferably sent as note data, and the note data is corrected to the note which specifies the call sound in that case at the time of reception.

[0010] This invention relates to the migration communication system accompanied by a mobile station, and the mobile station for radio. It While having the memory which remembers a call sound to be a means for transmitting and receiving voice, and a means for entering and reproducing the call sound as a signal of a call It is characterized by having a means for changing into an alphabetic character the call sound memorized by this memory, and sending it, and a means for sending with the call sound discrimination child who specifies said alphabetic character as the transmission information is called and it is sound transmission information.

[0011] This invention relates to the migration communication system accompanied by a mobile station, and the mobile station for radio. Moreover, it While having the call sound memory which remembers a call sound to be a means for transmitting and receiving voice, and a means for entering and reproducing the call sound as a signal of a call The means for detecting the call

sound discrimination child who the means for receiving the message accompanied by an alphabetic character and its message in the received message call, and tells that it is a sound, It is characterized by having a means for receiving a call sound as an alphabetic character, and a means for changing said alphabetic character into the form memorized by this call sound memory.

[0012] Furthermore, it is characterized by being sent to telephone as an alphabetic character in the call sound discrimination child specified as it is reproduced as a response of as opposed to [by that approach, a call sound is memorized by memory about the approach this invention programs the call sound of telephone, enter with a sound reproduction means, and] a call, as for this approach, a call sound is changed into an alphabetic character, that transmission information is called and it is sound transmission information.

[0013] This invention is characterized by to have a means for changing this call sound into an alphabetic character, and sending said alphabetic character, and a means for sending with the call sound-discrimination child who specifies said alphabetic character as the transmission information calls and it is sound transmission information while it has the call sound memory the terminal unit remembers a call sound to be also about the terminal unit for data transmission, and a means for transmitting the call sound.

[0014] In the 1st example of this invention, a call sound is sent by the short message as an alphabetic character. Since the message does not maintain a voice channel at a busy condition (engaged) when a call sound is sent to a mobile station by the short message, the user can be talking to coincidence with the mobile station. This short message is memorized by the memory of a transmission channel, and even if a call sound has [even if] a busy mobile station or is switched off during transmission in that case, it is sent to a mobile station.

[0015] It can call through the Internet from a computer and a sound can also be sent by the short message. Therefore, the users of a mobile station call and a sound can be sent mutually. A call sound is preferably sent as note data in the form of the alphabetic character in a short message. The mobile station of a receiving side receives the short message as an ordinary short message, and the prior announcement about the message which enters is unnecessary. The short message has a predetermined identifier, the mobile station of a receiving side calls it, is specified as a sound, and calls it, and sound memory is made to memorize it based on it. Moreover, in the mobile station of this invention, it is possible to call to a desirable thing with a user interface, and to program a sound by oneself, and a user can send mutually the call sound of the others which call and are memorized by the memory of a sound or a mobile station programmed by itself in that case. Therefore, the received call sound which is memorized by memory is also correctable with a user interface.

[0016] This invention simplifies programming of a call sound, and the user of a mobile station does not need to make it able to prepare for it not being necessary to operate it namely, in order for a new call sound to come to hand, and not programming a call sound with a user interface, calling to a mobile station, and receiving a sound, and can receive it directly by radio. Moreover, this invention increases possibility of programming a call sound, and a user can call from the 2nd user and can receive a sound. Since a call sound message calls the message which the mobile station itself received even if the user did nothing since the call sound discrimination child was included and specifies it as a sound, reception of a call sound is easy for it.

[0017] Next, with reference to an accompanying drawing, this invention is explained in detail.

[0018]

[Embodiment of the Invention] For an understanding of the 1st example of this invention,

transmission and reception of a short message are explained below.

[0019] In digital migration communication system, such as a GSM system, short text messages, i.e., the so-called short message, can also be sent besides a message and data transmission. It is known for the GSM system as SMS (Short Message Service). With a mobile station, receiving from the 2nd mobile station can also send text messages to the 2nd mobile station. One of the advantages of the short message service of a GSM system is being able to send a short message during a message at coincidence, or being able to receive, when the ordinary circuit joint communication link is performed. Therefore, it prepares for possibility that a call will enter, and a mobile station is not maintained at a busy condition (engaged) even if the short message is transmitted.

[0020] When a short message is transmitted, even if the advantage of the short message in the comparison with a message with telephone cannot contact a receiving set, it is being able to send this message to a receiving set. :, i.e., a short message, realized when this divides transmission of the short message from the 1st mobile station to the 2nd mobile station into two parts as shown in drawing 1 is sent to SM-SC (Short Message Service Centre (short message service pin center,large)) from the mobile station MS 1 which transmits, a short message is memorized here, and immediately after being able to contact, it is immediately sent further to the mobile station MS 2 of the actual destination, i.e., a receiving side. The connection with migration communication system from short message service pin center,large SM-SC is illustrated in detail by drawing 2 . Next, with reference to drawing 15 , it explains that a short message flows [transmission and] between various interfaces.

[0021] Drawing 2 shows the structure of migration communication system, and the connection for transmitting a short message. A mobile station MS is connected to a base station BTS by radio. A base station BTS is further connected to the base station controller BSC which controls and manages some base stations through the so-called Abis interface. The stereo which consists of one base station controller BSC which controls some base stations (usually dozens of pieces) BTS and those base stations is called base station system BSS. Especially the base station controller BSC manages a radio channel and hand-over. On the other hand, the base station controller BSC is connected to migration service exchange center MSC through the so-called A interface, and this MSC adjusts formation of both the connection from a mobile station, and the connection with a mobile station. It lets migration service exchange center MSC pass, and connection out of a mobil radio communication network is formed further. Above-mentioned short message service pin center,large SM-SC is combined with migration service exchange center MSC.

[0022] A user writes in the message which should be sent (using the user interface of this mobile station), or searches from memory and presents the telephone number of the mobile station MS 2 which is going to send the message, i.e., the identifier of a mobile station MS 2, to send a short message with a mobile station MS 1 (drawing 1). Moreover, the mobile station should have contact information, i.e., the telephone number of short message service pin center,large SM-SC. Usually, it is memorized by the memory of a mobile station, and whenever it tends to transmit each short message in that case, it does not need to input the telephone number separately. Therefore, when sending a short message, this message goes to a base station BTS from a mobile station MS, and goes to short message service pin center,large SM-SC further through the base station controller BSC and migration service exchange center MSC from there. Although a short message is memorized by short message service pin center,large SM-SC and this short message is further sent to the mobile station MS 2 by the side of reception from there, although the path of

this message is the same transmission route, the direction is reverse in that case. Short message service pin center, large SM-SC receives [whether the mobile station MS 2 received the short message and] a notice. Therefore, if the mobile station MS 2 has not received it by a certain reason, the short message can be resent.

[0023] Moreover, a short message can be sent from PC. In this case, migration service exchange center MSC connected with Server GTW (gateway), and this server is connected with the Internet. In this case, PC linked to the Internet can download from the Internet the WWW (World Wide Web (World Wide Web)) page which Server GTW has for transmission of a short message. If a user inputs the telephone number of the reception side mobile station MS 2, and the message which transmits into this WWW page, that message can be sent now from this PC, a message will go to migration service exchange center MSC through the Internet and Server GTW in that case, it will go to short message service pin center, large SM-SC further, and that message will be further sent to the mobile station MS 2 by the side of reception through a mobil radio communication network from here.

[0024] It is possible to send the message of die length of 160 characters at the maximum at once by the short message service SMS of a GSM system. An alphabetic character is the 7-bit ASCII (American National Standard Code for Information Interchange) alphabetic character (American Standard Code for Information Interchange), therefore the greatest die length of the message expressed with the bit is 1,120 bits, i.e., 140 bytes. The ordinary mobile station as shown in drawing 3 has a small display and the keyboard which progressed, can write a short message by this, namely, can input various alphabetic characters and figures. The received message is expressed as the display of the mobile station which makes it possible to display an alphabetic character and a figure as shown in drawing 3 .

[0025] As everyone knows, transmission information is divided into some frames in the GSM system. When the die length of the message which should be transmitted is longer than the length between couplings with which Frame FR is permitted, Message M must be divided into partial M1-M4, and must be sent by some (segmented) frame FR1-FR4 as shown in drawing 4 (A). At the time of reception, a mobile station reconfigurates the message M currently divided at some frame FR1-FR4 as shown at drawing 4 (B). In a wireless interface (drawing 2), the maximum length of a frame is usually 168 or 184 bits, therefore a short message (the maximum length is 1,120 bits) must be divided into some frames. Drawing 5 shows the frame transmitted with a wireless interface, and the so-called LAPDm frame (Link Access Protocol for the Dm channel (link access protocol for Dm channels)), and it is usually divided into the three fields. The 1st field is address field ADD and this includes the address (namely, mobile station identifier of a receiving side) expressed with some cutting tools of the destination of the message. In a GSM system, a signaling message is also transmitted within the corresponding LAPDm frame. In radio, the flow (namely, a signaling message and a short message) of two messages may exist in coincidence independently mutually. the link identifier by which the two different flow should be added to address field ADD -- namely, -- being the so-called -- it dissociates mutually "SAPI and (Service Access Point Identifier (Service Access Point identifier)) be alike." The value can be 3 which means signaling, or 0 which means a short message. The 2nd field is control field CTRL and this field contains transmitting frame number N (S) and receiving frame number N (F). The 3rd field is the data field INFO which includes actual information, and this includes the contents of 168-bit information, i.e., an actual short message, at the maximum.

[0026] Transmission of each call sound is specified, specific character code, i.e., identifier, in that case, the mobile station of a receiving side can process the message which received, and

direct conversion can be carried out [sound / as specified / call]. That identifier is preferably expressed with the ASCII character in the information field (drawing 5) INFO, i.e., the field, of a short message transmission frame, and this field includes the actual short message expressed in written form. This identifier is an identifier created by the approach of the identifier on which it has agreed beforehand, or others, and knows with that as which it calls and the both sides of the equipment of a transmitting side and the equipment of a receiving side mean a sound (for example, sequence-of-numbers "120" of the beginning of a short message). Since a call sound is sent by the short message, although this kind of call sound programming service is not supported, it is receivable with the ordinary mobile station which can transmit and receive a short message. If a call sound identifier is put on Field INFO, although this kind of call sound programming service is not supported, it will call and the advantage which called with the ordinary mobile station which can transmit and receive a short message, and was expressed with the sound identifier and the alphabetic character that both sounds are displayed to a user will also be acquired. Moreover, it is also possible by writing the identifier of the call sound in question in a message in written form, dividing correctly in written form, the further remaining information, i.e., call sound, and writing it in first, with this kind of ordinary mobile station, to transmit a message like the above-mentioned message. The call sound to which receiving **** was received completely is made with the mobile station of this invention in such transmission information.

[0027] Or the identifier of the short message which includes a call sound is formed as a specific bit code of the address field of a short message, or control field (see drawing 5). Also in this case, although the transmitted call sound is receivable as an alphabetic character with an ordinary mobile station, that call sound cannot be memorized by call sound memory. In this case, if a mobile station is not changed so that said bit code may be added by the specific command, a user cannot send this kind of call sound with an ordinary mobile station, even if other parts can input a right alphabetic character (if there is nothing as if, because an ordinary mobile station cannot tell a call sound identifier).

[0028] Instead of carrying out the character code (inside of a data field INFO) of the call sound identifier in a short message, and displaying it, it can display within the address field ADD of a short message, and this identifier is expressed with a bit in that case. the specific cutting tool in the address field of the transmission frame of a short message -- being the so-called -- TP-Data-Coding-Scheme (TP-data coding device) -- it is -- it -- GSM specification GSM 03.40 -- and -- It is specified by 03.38. Since 4 bits of that cutting tool's least significant can be used freely, it can indicate that this short message calls and the sound is included by using them and giving the value with which it has agreed on 0000 or others above cutting tool b3-b0 (this b0 is this cutting tool's least significant bit) according to this invention.

[0029] If a call sound is displayed on this appearance, it will not take the tooth space left behind for the die length (they are 160 characters at the maximum) of the alphabetic character of a short message.

[0030] As follows, a call sound can be changed into an alphabetic character and it can include in a short message as an alphabetic character of the form of a note.

score expressed in written form: C, D, .., G, A and H Note from A to G of a low octave c, d, .., g, a and h Note from A to G of a quantity octave # the note to precede -- semitone -- ***** (for example, high (high))

b [] the note to precede -- semitone -- ***** (for example, blunt (dull))

Persistence time: Have no alphabetic character. The basic die length - The note to precede: One

half of basic length + The note to precede: Twice of basic length - The note to precede: 1.5 times of basic length .. The note to precede: 1.75 times of basic length [0031] A single alphabetic character contributes to the effectiveness of the alphabetic character always preceded with it cumulatively [a die-length alphabetic character]. for example, C+ -- 3 times of basic length -- meaning -- C --- means 0.125 times of basic length.

Rest: ; Rest; the same die length as basic length Rest; the die length of the one half of basic length [0032] Other rests can be inputted with the alphabetic character which corrects the die length of a note using a rest alphabetic character.

[0033] As mentioned above, the received alphabetic character is processed, the call sound made by the note can be encoded in the alphabetic character which can be sent by the short message, it calls and can be changed into a sound, and at the time of reception, when [at which a telephone rings] transmitted, it can be memorized by call sound memory, and it can be reproduced.

Therefore, this approach is suitable for especially the equipment that a call sound can be programmed as a note through a user interface, or a call sound calls as a note, and is beforehand memorized by sound memory.

[0034] other element relevant to a call sound besides the above-mentioned specification, and its specification -- for example, ::ACD:X which can also be specified as an alphabetic character as follows here -- a number (integer) with optional X -- it is -- note train only an ACD X time is made to repeat -- if -- if there is no X -- 2 times.

/X ACD/ Here, X is an optional number (integer), for example, is a number. By breaking by X, it is an alphabetic character. "/" The die length of an inner note is shortened. At this specification, a third note is "/3 ACD/". It is expressed with the sign to say.

\$ For example, it is not necessary to input Sharp or a flat note about no notes in a parenthesis, and to input alphabetic character # or b independently about these notes in that case.

(:) (5CD:2 E:F) specified repeatedly It is performed with CDE CDE CDF CDCD.

! Switch-on / switch-off of the "staccato (staccato)" music mode is carried out to the following alphabetic character, only a suitable rate lengthens the die length of a note, the rate of a pause is made small, and a fragmentary style is attained, without changing the whole time amount. computer simulation -- the die length of a note -- 50-60% -- or even if it lengthens no less than 70%, it is echoed still better.

? Switch-on / switch-off of the separation note function is carried out to the following alphabetic character, only the minimum time amount lengthens the die length of a note, a pause continues over the remaining part of music playback time amount, unlike "flow (flowing)" music mode, the two same continuous notes can be heard as a separate note, and the note to precede can be heard as one note here. The pause between notes must have the same persistence time. A note shorter than the specified pause cannot be heard with a separate note. In computer simulation, the pause between the notes which continue for about 30ms is echoed good by the separation note function.

' -- A default octave (a default octave) is raised. If a default octave is 1, it will be raised to 2, otherwise it is 1.

" -- A default octave is lowered. If a default octave becomes three, it will be lowered to 2, otherwise it is 3. If it is assumed that four octaves are used, they will be a capital letter and a small letter as mentioned above. C..H and c..h Two octaves can be used for coincidence.

X All notes that follow X is raised only 1 degree (one degree). Here, X is an integer. If It will lower, if X is a negative number.

Number (number) (Number (alone)) Il Tempo and the number of beats per minute, for example, the number of the notes of the basic length per minute, are specified.

An empty tooth space is disregarded.

[0035] Moreover, :* which it can call [*] through a user interface and can combine other messages with a sound Flashing light-light when the telephone is ringing is switched to ON/OFF.

[0036] Next, with reference to drawing 6 , the configuration of the mobile station of this invention and its actuation at the time of transmitting and receiving a call sound as a short message are explained in detail.

[0037] The block diagram of the configuration of the mobile station of this invention is shown in drawing 6 . This mobile station is a mobile station which has the circuit and user interface which enable programming of a call sound preferably. A mobile station 1 has radio equipment RU (this reference mark is not describing in drawing) for the communication link by radio. This communication device the transmitting section 2 (encryption coding and an interleave --) known from the ordinary mobile station The receive section 3 (a reception and recovery) which consists of the block which performs modulation and transmission it consists of code discharge, interleave discharge, and an activation block -- it consists of the double (duplex) filter 4 which distinguishes the message by which it was received for performing transmission by radio in a list, and the message transmitted, and the antenna 5. This mobile station has the main control circuit 6 which controls the actuation. Furthermore, a main control circuit 6 has the RU controller 7 which performs the control function of a still more ordinary mobile station. Moreover, the main control circuit 6 of a mobile station has the block 8-12 for calling according to this invention and transmitting a sound as a short message. Therefore, it can say that the block 8-12 forms data-processor DU of a mobile station, and it can also be completely formed by programming a main control circuit (processor) 6. The control section of radio equipment RU and data-processor DU of a mobile station does not need to be unified by the main control circuit, they can also be separately realized to **, the RU control circuit 7 can be put on a radio equipment side, the DU processor 8 can be put on a data-processor side, and this DU processor 8 is connected with the RU control circuit 7 in order to establish the communication link between radio equipment and a data processor.

[0038] The 1st memory 13 is combined with the main control circuit 6 with the configuration shown in drawing 6 . This 1st memory may be volatile memory, such as RAM, and a main control circuit makes this memorize data in use. Moreover, a mobile station has the 2nd memory 14, as for this, it is desirable that it is Permanent memory 14, and data indispensable to the function of a mobile station of a short message and call sound and others and other data memorized [user / make / it / **] permanently are memorized by the 2nd memory 14. Or a short message can also be made to memorize off-line in the memory (for there to be connection with a main control circuit 6 from here) of the intelligent card combined with a mobile station. This kind of intelligent card is known as a SIM card (Subscriber Identity Module (subscriber identity module)) for example, from GSM migration communication system, and it usually has the storage which memorizes the telephone number etc.

[0039] The user interface of a mobile station consists of input units, a display 15, the keyboard or others, for example, the touch display etc., for inputting data, etc., 16.

[0040] When data-processor DU and radio equipment RU are constituted as an isolated system about a function, both are in common or, as for them, should have separate memory 13 and 14 and a separate user interface UI. The communication link between those equipments is established by connection between the DU processor 8 and the RU control circuit 7, and it is called the external control interface ECI by this relation.

[0041] Next, actuation of the mobile station when transmitting a call sound is explained.

Although a desired call sound is searched from memory by the user interface UI, as for a control circuit 7, based on 16 kinds of commands from an input unit, a call sound is searched from memory 14 in that case. When inputting the command with which a user calls with an input unit and sends a sound, although a character string is created from a call sound, this processor puts call sound discrimination children, such as sequence-of-numbers "120", on the beginning of the character string (when this identifier is not displayed by the address field), it is called to a degree, changes a sound into alphabetic characters, such as the above-mentioned ASCII character, and, as for the DU processor 8, places the alphabetic character after this identifier. As mentioned above, via the air, a short message is a bit, namely, is sent as the binary character in a frame. The DU processor 8 converts an ASCII character with the binary character. One method of performing this conversion is explained later. Therefore, it has the transliteration function to process an alphabetic character, it realizes programmably and it is memorized by memory 14, the DU processor 8 searches the program and the DU processor 8 performs this function after this according to the program. The DU processor 8 transmits the created character string to the SMS transmitting controller 10, and adds this controller to that message based on the information as which the user inputted address information, i.e., the information about the destination.

Therefore, this kind of SMS transmitting controller is a kind of bit and/or character generator. It realizes as an application program preferably, the function to change a call sound into an alphabetic character is memorized by memory 14, and the DU processor 8 uses it.

[0042] If address information is added by the SMS transmitting controller 10, the message is transmitted to an out-box 11, this tries to send the message, it has a buffer, and supposing transmission goes wrong, this message will be memorized in it. Supposing transmission goes wrong, an out-box 11 will carry out the attempt which resends a message. If the DU controller 8 notices radio equipment RU being in the condition that a message can be sent That message is transmitted to the message transfer operating circuit (message transfer running circuit) 12. This circuit 12 Validity information (validity information) (this) Whether it goes to a message service center from the message progressing in which direction, i.e., a mobile station Or the information relevant to the migration communication system in question, like it is shown whether the it progresses conversely is added to the message. Carry out transform processing to the form where migration communication system requires address information, and the address and the short message identifier (SAPI) of a message service center are added to this message. The digital signal for a sending set 2 is formed from the information which should be transmitted, and this message is sent to the wireless transmitting section 2 of radio equipment RU. When a call sound discrimination child is put on the bit of an address field ADD, an operating circuit 12 adds the identifier in question to this message. The transmitting section 2 creates the frame which should be transmitted based on the signal with which it encoded according to the specification (specification) of migration communication system, and this transmitting section received the signal from the operating circuit 12, a sending set is sent to short message service pin center,large SM-SC by radio, and, as for this frame, this frame is further sent to a receiving set (see drawing 1) from delivery and here. In the transmitting section 2, a message receives processing of coding, an interleave, encryption, burst formation, a modulation, transmission, etc. according to migration communication system.

[0043] Block 8 and actuation of 10-12 can also be performed with PC connected to a short message service pin center,large through the Internet. Actuation 8 and 10-12 may be performed programmably, and can make the memory of a computer memorize various call sounds with the processor of a computer. In that case, naturally block 12 can be combined with the output port or

modem of a computer, and it can assume that the Internet can be contacted from there, therefore a message can be sent to a short message service pin center, large, and this short message service pin center, large transmits a short message to the mobile station of a receiving side as shown in drawing 2 .

[0044] Next, actuation of the mobile station at the time of receiving a call sound as a short message is explained. When a communicator calls and a sound is received as a short message, the message reaches radio equipment RU first. Then, according to migration communication system, processing of reception, a recovery, code discharge, interleave discharge, decode, etc. is performed to the message in a receive section 3. This can be memory the received frame identifier (SAPI) remembers a message to be although it will be transmitted to the destination box 9 of a data processor if the message shows that it is a short message. the memory by which the received short message is put on the SIM card -- or Permanent memory 14 of a mobile station can memorize. If the received message is an ordinary short message, the DU processor 8 will tell the received short message. If the message has the identifier which the message calls and shows that it is a sound, the DU processor 8 converts the binary character with an ASCII character, will call the ASCII character further, will change it into a sound, and will make Permanent memory 14 memorize the call sound. Or this contractor will understand that a user can be first asked about whether a Permanent memory is made to memorize it [having been received] which calls and accepts a sound. Moreover, an error checking can also be added to conversion actuation so that DU processor may inspect whether the received sequence has an error. Although the call sound sequence will be called as a call sound and the sound memory 14 will memorize if errorless, reception of a short message is displayed to a user as a received call sound in that case. When there is an error, the call sound sequence is only memorized by the short message memory 14 as an ordinary short message without call sound memory's memorizing. If a call sound is received with the sufficient result, the DU processor 8 can start the application which programs and calls a call sound and is displayed on a display 15 by making a sound into a note (if the mobile station has such application).

[0045] Next, one method of converting an ASCII character with the binary character is explained. An ASCII character can be displayed as a hexadecimal and it can be changed into a binary number still more easily. Next, it explains how a word called "Calling" is changed into a binary number. By the following description, two hexadecimal separated in the tooth space correspond to an ASCII character, the alphabetic character of the hexadecimal of each can be expressed with 4 bits, namely, each ASCII character is expressed with 8 bits as follows.

ASCII character: Calling Form of a hexadecimal: 43 61 6C 6C 69 6E 67 Form of a binary number: 0100 0011 0110 0001 0110 1100 0110 1100 0110 1001 0110 1110 0110 0111 [0046] In actual transmission, an alphabetic character is sent without a tooth space one after another as a continuous bit string. Therefore, in order for there to be a specific hexadecimal form and a specific binary number form and to specify a note by the ASCII character in this case about each ASCII character, the example shown above is convertible for the alphabetic character of a binary number.

[0047] If assignment of a note is changed into the call sound message of the form of a binary number, it is an infrared signal according to an infrared link, or can send easily by USSD, and it can also be sent as an alphabetic character as well as the case of SMS in that case. It is possible to prepare an infrared link as everyone knows, in order to transmit and receive an infrared signal to a mobile station. Therefore, the mobile station other than the wireless part 2-5 can have the infrared sending set and infrared receiving set which were similarly connected to the main

control circuit 6 as shown in drawing 6 . In order to send a call sound by USSD, correction required for the transmitting block 2 and a receiving block 3 can be performed.

[0048] Although another method of sending a call sound as an alphabetic character changes it into a MIDI (Musical Instrument Data Interface) form (musical instrument data interface) first, this is the communications language of common knowledge for musical instruments. This can be performed by preparing a MIDI converter in a mobile station. A MIDI converter is preferably put on the DU processor 8, and the DU processor 8 changes the alphabetic character received by MIDI at the time of reception into the form of being suitable for the call sound generator and memory of telephone, in this case. Similarly, at the time of transmission, a MIDI converter changes a call sound into an alphabetic character according to a MIDI form. A MIDI converter makes it possible to call by the composition program (composition programs) based on the computer which supports a MIDI form, to compose a sound, and to send the made melody to a mobile station by the short message from a computer.

[0049] Next, with reference to drawing 7 (B), the approach as one example of realizing the above-mentioned application for calling with a user interface and programming a sound, i.e., the one approach of calling by telephone and programming a sound as a note, is explained. In this example, a score (stave) can be made on the display 15 of a mobile station, a desired note can be chosen by the menu and Keys 30a and 30b which were displayed on the display, and that selected note can be put on the location of a request of the score currently displayed on the display with the cursor moved by the key. In a mobile station, a large-sized display can realize the display shown in drawing 7 (B), or, similarly the score of a graphic form can be realized on the liquid crystal display of a matrix type on the display of the size of an ordinary mobile station.

[0050] In this example, while being able to choose the desired Otobe notation (clef) from the menu displayed on a display through a key, a note can be put on the location always directed by cursor, and that persistence time and pitch (pitch) (namely, location on a score (stave)) can be changed into Keys 30a and 30b and a list with a menu. in order to correct the persistence time of a note -- key 30b -- letting it pass -- a persistence time menu -- accessing -- browsing key 30a -- letting it pass -- 1/8 note (eighth note), a quarter note (quarter note), a half note, and a whole note -- or 1/8 rest, a quarter rest, a half-rest, and all rests can be chosen on a score. These notes are shown in drawing 7 (A). Similarly, in order to correct the pitch (location of the perpendicular direction on the score of the note) of a note The location of the note on a score can be raised by pushing browsing key (browse key) 30a in the one direction (this key pointing out the upper part). Moreover, the location of the note on a score can be lowered by pushing browsing key 30a in other directions (this key pointing out a lower part). Thus, for example, a rest, c, d, e, f, g, a, h and c1, d1, e1 and f1, g1, a1, h1, c2, d2, e2, f2, g2, a2, h2, etc. can be made from any notes to wish. It lets browsing key 30a pass. Sharp (cis, dis, eis, fis, gis, ais, his, cis1, dis1, ..., cis2, and dis2, ..., his2) and a flat (ces, des, es, fes, ges, as, b, ces1, and des1, ..., ces2 --) The note of des2, ..., b2 can also be made, and although the notation which shows the Sharp note or a flat note before a note on a display in that case is made, it is also shown in drawing 7 (A). Thus, a desired note and a desired rest can be made in order on a score so that a melody may have 60 continuous notes at the maximum, for example. The example of the display of the mobile station used as melody creation mode is shown in drawing 7 (B), this drawing shows a score, the Otobe notation, various notes, and cursor (arrow head), and it directs the location of a note and can change that die length (persistence time) and pitch like the time of choosing the above-mentioned note. On the score shown in drawing 7 (B), the 3rd note and the 4th note are the examples of the Sharp (it went up) note from the left.

[0051] As an alternative plan which makes a sound (tones) with a key and a menu, a note can be displayed as an icon (icons) on a display on a score, this icon can be dragged with the pointer moved with the so-called spin wheel and the so-called trackball (track ball) (drag), and it can release in the location of the request on a score (that is, it places). If a touch display is used, it is necessary to use neither a spin wheel nor a trackball, and the icon in question can be placed on a score with a finger or a pen in that case.

[0052] Moreover, by the user interface, Il Tempo can be set up with the number bpm of beats around for 1 minute etc., and the created call sound (melody written on the score) is reproduced by the Il Tempo. In this case, the die length of the quarter note expressed per ms is $t = 1000 (60 - /tempo)$, and in this case, if Il Tempo is 150bpm(s), the die length of a quarter note (fourth note) will become 400ms or 0.4 seconds. It is this Il Tempo 50 ... It can set up by the number between 999bpm(s). Il Tempo is set up by choosing the Il Tempo command from a menu preferably, and can input desired Il Tempo on a display through a key in that case.

[0053] It is also programmable through the ordinary keyboard of the telephone which displays on a display by making a note into a literal notation as an option, and has/or 12 keys (a key 0-9, *, and #). In this case, it can let a specific key pass or each sound (a note or rest) can be made as a combination of two keys. Pressing one or two keys corresponds to a specific sound. In this case, as mentioned above The note corresponding to it can be displayed on the display of a mobile station as a response to the actuation which presses this key (as a literal notation -- as the note on a score). The sound can also be reproduced through the loudspeaker of a mobile station as a response to the actuation which presses a key, and a user can hear it in that case. the persistence time of the actuation which presses a key -- or the persistence time of the actuation which the latter pushes when actuation to push is performed twice in succession is proportional to the die length of the sound. Moreover, by the approach same with having mentioned above about calling for a short message and, for example, changing a sound, it can call by inputting an alphabetic character through a user interface, and programming of a sound can be performed.

[0054] Next, with reference to drawing 6, how to call by telephone and create a sound is explained. central apparatus 6 are memorized by memory 14 by the short message considering the sound (note) chosen from the user interface UI which consists of a keyboard 16 and/or a display 15 according to the above-mentioned approach by the user or -- as a melody with perfect reception and it. When a call enters, according to the specification of migration communication system, the message from a base station reaches a mobile station first. This message is received by the receiving set 3 from the antenna 5 of a mobile station, and this message reaches central apparatus 6 from there. Answering this, central apparatus 6 give a control signal 19 to an acoustic generator 17. Although an acoustic generator 17 emits a call sound based on the control signal, it is the sequence of the sound which has a specific frequency based on the melody specified by the note. Central apparatus 6 make a control signal by reading the call sound memorized by memory 14 from this memory 14. Therefore, the control signal 19 includes the information for the acoustic generator 17 which an acoustic generator 17 should make and which calls and specifies the class of sound for the call sound regenerative apparatus 20, and this equipment 20 is a converter for changing the electrical signal of a buzzer, a loudspeaker, or others into a sound. If telephone is answered when a user presses a response key, a user interface UI gives a signal to central apparatus 6, it will stop this equipment's calling to an acoustic generator as a response to the actuation which presses a key, and giving the sound control signal 19, and will call now, and a sound will die down.

[0055] Codec Codec of marketing currently manufactured by SGS-Thomson as an acoustic

generator 17 Although ST5090 circuit can be used, it contains the acoustic generator which can make the sounds, i.e., the sound of 256 pieces from which a frequency differs respectively, spaced [between 15.6Hz ... 3,984Hz] at 15.6Hz. Although the frequency of a sound is made based on the 8-bit signal showing the number between 0-256, it is ** that correspond to the step 1 of several 1 acoustic generator of a control signal, i.e., the frequency of 15.6Hz, in that case, and several 2 deals with the frequency of 31.2Hz similarly etc. Therefore, although it can reproduce as a sound and the above-mentioned sound is explained by the following description about some of them with the following control signal (cutting tool) which is the following frequency (not a not necessarily exact value but the digit is shown), and is brought to an acoustic generator, the remainder may be determined by this contractor according to the above-mentioned principle.

[0056] a= 880Hz corresponds to step 56 of an acoustic generator, i.e., control byte'00111000', (in accuracy). $56 \times 15.6\text{Hz} = 873.6\text{Hz}$, ais=932Hz, and b= 988Hz correspond to step 63 of an acoustic generator, i.e., control byte'00111111', (accuracy $63 \times 15.6\text{Hz} = 982.8\text{Hz}$). c1 =1,047Hz, 1 = 1,109Hz of cis(es), and d1 = 1,175Hz, 1 = 1,245Hz of dis(es), and e1 = 1,319Hz f1 = 1,397Hz and fis1 = 1,480Hz g 1 = 1,568Hz and a1 = 1,760Hz, 1 = 1,865Hz of ais(es), and h1 = 1,976Hz c2 = 2,093Hz and cis2 = 2,217Hz d2 = 2,349Hz and dis2 = 2,489Hz e 2 = 2,637Hz and f2 = 2,793Hz Correspond to step 226 of an acoustic generator, i.e., control byte'11100010', 2,793Hz and 2 = 2,960Hz [of fis(es)] g 2 = 3,136Hz and 2 = 3,322Hz of gis(es), and a2 =3,520Hz (in accuracy). $226 \times 15.6\text{Hz} = 3,525.6\text{Hz}$.

[0057] Each sound c-a2 The frequency corresponding to those raised sounds and sounds made low is preferably defined beforehand in a mobile station (or sound required at least to make a call sound), for example, is memorized by memory 14. 60 bytes will be memorized by this memory, supposing 1 byte is memorized by memory 14 about each sound (tone or sound) which should be made and the melody consists of the sound of 60 pieces in that case. Central apparatus 6 search those cutting tools from memory 14 (12), and in order to call the melody and to reproduce as a sound, they control an acoustic generator 17. The aforementioned well-known ***** (codec) circuit also has clocked into and an internal clock signal generator, and it is illustrated by drawing 6 as an off-line clock generation machine 18 which controls actuation of an acoustic generator 17 according to specific clock tempo. This clock tempo is fixable so that Il Tempo of an acoustic generator may be set as 150bpm(s). Il Tempo can also be specified by the short message, and it can also change through a user interface. Set-up Il Tempo is memorized by memory 14 and an acoustic generator 17 is controlled to emit a sound by Il Tempo to which this acoustic generator was set based on the signal received from the clock generation machine 18.

[0058] Central apparatus 6 identify the actuation which presses an alphabetic character (namely, alphabetic character made through the user interface UI), or a key, process them in the frequency corresponding to the actuation which presses this alphabetic character or its key, and memory 14 is made to memorize the signal corresponding to the frequency, and it is brought to an acoustic generator 17 when a call sound is reproduced.

[0059] Other approaches of making the control signal for a sound system 20 are using a counter, for example, the 16-bit counter counted down from 65,535 to zero, as an acoustic generator. When reproducing sound, actuation of the counter is enabled so that it may count down from a predetermined figure (release). When a counter reaches 0, a pulse is generated and this counter begins to count down again from a predetermined figure. Sound consists of some pulses. A counter is counted in 1 / 18 seconds from 65,535 to 0, and the pulse wave which is equivalent to 18Hz in that case is made. In this case, supposing 4,096 is given to a counter as a predetermined

figure (a counter is counted from 4,096 to 0 in this case), the pulse wave which has a $\times(65,535/4,096)18=288\text{Hz}$ frequency will be made. Thus, the pulse wave which has various frequencies between 18Hz - 1.18 MHz can be made. The made pulse wave which carried out such can be used as Pulse Density Modulation which should be inputted into sound systems, such as a buzzer which vibrates according to the pulse wave.

[0060] As everyone knows, a user can choose from the present telephone the call sound which you want to reproduce when telephone sounds and which is memorized by call sound memory through a user interface.

[0061] This invention makes it possible for a new call sound to come to hand promptly and simply from telephone. A user calls through a user interface, and it is not necessary to program a sound or and he does not need to carry out to the service store which loads a call sound electronically with telephone. It is not necessary to prepare the call sound memory of telephone, and a call sound can be directly received by radio. Moreover, a user can call to the 2nd mobile station by himself, and can send a sound. Furthermore, it can call from the computer connected with the short message service pin center, large, for example through the Internet, and a sound can also be sent to a mobile station by the short message.

[0062] This specification gives an example for the configuration and example of this invention, and is explained. It is clear for this contractor that this invention can be carried out in another form, without deviating from that it is not that by which this invention is limited to the details of the above-mentioned example, and the description of this invention. The indicated example must not be understood as what limits for the purpose of explanation. Therefore, possibility of carrying out and using this invention is limited by only the claim. Therefore, various alternative also containing an equal object which is defined by each claim and which carries out invention is also the things of this invention within the limits.

[Translation done.]

TECHNICAL FIELD

[Field of the Invention] This invention is called in telephone by this approach about the approach of programming the call sound of telephone, and a sound is memorized by call sound memory and reproduced by the sound playback means as a response to an entering call. This invention consists of at least one mobile station of the for a mobil radio communication network and for radio in this system also about a mobile station and migration communication system, and this system has the memory which remembers a call sound to be a means for transmitting and receiving voice, and a means for reproducing the call sound as a signal of an entering call.

[Translation done.]

PRIOR ART

[Description of the Prior Art] A mobile phone is called like ordinary telephone from the first, and has a sound, and it resembles in general the sound in which a clock rings. The situation that the specific mold and the mobile phone of a model were troubled when [one / at which it was decided] it called and had only a sound arises. When two users who are present in the same location have the mobile phone which emits the same type, therefore the call sound of the same class, the telephone which is sounding truly understands in that [whose] and is confusing. This problem is solved by making it depend for a call sound on a user's own telephone number or a calling party's telephone number. However, since the call sound emitted based on the two almost same telephone numbers is very well alike and can be heard, it is difficult to distinguish one call sound from other call sounds. Moreover, although the call sound effectiveness that tones mainly differ by calling based on the telephone number and making a sound is attained, it may irritate a user, namely, a user cannot call so that liking of it may be suited, and cannot choose a sound.

[0003] A mobile phone takes this problem for progressing, and it is solved further. Some kinds of call sounds are usually beforehand memorized by current and the mobile phone, and a user can choose a favorite call sound now out of it. The melody in the music work loved widely calls, the latest technology other than an ordinary call sound is realized as a sound, and it has a call sound which can also choose them. While a mobile phone comes to be used very widely and other someone's telephone was sounding, it turned out that the user of how many person thing mobile phone is inadequate even if the call sound of a mobile phone has no less than ten kinds in order to solve the problem which thinks that its own telephone is sounding. Moreover, that neither goes into a user's mind may also occur [of the call sound memorized beforehand]. By ordinary telephone only with the call sound of the limited class, the same problem often occurs.

[0004] Such a situation is improved by calling with the user interface of telephone or other communication devices, and enabling it to program a sound. One solution is indicated by U.S. Pat. No. 4866766, and according to the solution, a user can input into telephone the various parameters which define call sound sequences of a pulse form, such as the number of the number of the pulses in a frequency, pulse duration, and a group, the time amount between pulses, and the groups of a pulse. These parameters are inputted as various numbers. The call sound of a paging device is programmable by other solutions' being indicated by the official report WO 92/03891, and switching the specific pixel on a matrix display to ON with the solution, or illuminating it. The location of the perpendicular direction of a pixel corresponds to the specific pitch (pitch) of a note (E, F, G, A, H, C, D), and the persistence time of a note is determined according to a continuous pixel. The solution to which others correspond is indicated by the official report EP 684591A1, and with the solution, it is possible to call on the display of a paging device and to program a sound, and the pitch of a note can be displayed as a literal notation (DO, RE, MI, FA, SO, LA, TI) on a display, and can change the persistence time of a note now as a sequence of some same literal notations. Since it calls to the above-mentioned solution and there is a fault about programming of a sound, it is possible for a certain solution to be indicated by the Finland patent application 960858 for which it applied on February 23, 1996, to call by inputting a note in the form of the note of a graphic form directly in the solution on the score displayed on the display, for example, and to program a sound as a note.

[0005] However, programming of the call sound which leads a user interface has a fault. A user has to take a troublesome procedure of inputting various parameters, alphabetic characters, or notes by various approaches. Moreover, in many of above-mentioned examples, the user is

assumed to have the knowledge of music theory, in order to make a specific melody by his own telephone.

[0006] The solution for making programming of a call sound easy is indicated by U.S. Pat. No. 4868561, and the owner of a paging device can obtain the new call sound for the paging device via the air with the solution. It is attained as follows, i.e., the owner of a paging device tells the identifier (telephone number) of this paging device, telephoning the operator of a paging system, and it chooses the call sound of hope from the catalog which he already has, and tells the operator of a paging system about the identifier of the call sound. In this case, by calling a paging sending set first and sending a sound modification message to a paging device, call to a paging device, sound modification is made to prepare, and it replaces with the new call sound sequence a paging sending set has a call sound sequence remembered by delivery, and the paging device was remembered to be by memory and which received the sound sequence via the air by calling after that.

[0007] With the above-mentioned solution for programming a call sound, there is a fault that the call sound in which the user needed to contact the paging sending set treating various call sounds separately, the user appears in the paging sending set and a user's catalog, therefore he knows the identifier can come to hand. Moreover, since it is maintained as a channel is busy, when the call sound sequence is transmitted, as for a paging device, a paging message is unreceivable to coincidence in the meantime. Similarly, only the operator of a paging system can perform programming, namely, there is a fault that a call sound sequence can be transmitted via the air. Furthermore, a paging device (the call sound memory) must be called first, must prepare towards sound modification, and requires the additional transmission for it.

[Translation done.]

PRIOR ART

[Description of the Prior Art] A mobile phone is called like ordinary telephone from the first, and has a sound, and it resembles in general the sound in which a clock rings. The situation that the specific mold and the mobile phone of a model were troubled when [one / at which it was decided] it called and had only a sound arises. When two users who are present in the same location have the mobile phone which emits the same type, therefore the call sound of the same class, the telephone which is sounding truly understands in that [whose] and is confusing. This problem is solved by making it depend for a call sound on a user's own telephone number or a calling party's telephone number. However, since the call sound emitted based on the two almost same telephone numbers is very well alike and can be heard, it is difficult to distinguish one call sound from other call sounds. Moreover, although the call sound effectiveness that tones mainly differ by calling based on the telephone number and making a sound is attained, it may irritate a user, namely, a user cannot call so that liking of it may be suited, and cannot choose a sound.

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programming, namely, there is a fault that a call sound sequence can be transmitted via the air. Furthermore, a paging device (the call sound memory) must be called first, must prepare towards sound modification, and requires the additional transmission for it.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Other solutions relevant to sending an audio via the air are indicated by the official report WO 96/06417, and this is indicating the paging system which can include a musical piece sound (audio composition) in the paging message by which a sending set is sent to a pager. While message data will be expressed as a display when the usual alarm tone is emitted and a user reads that message if a pager receives that message, informational power of expression is heightened by the musical piece sound contained in that message being reproduced by the audio converter, carrying out in this way, and mixing acoustic-sense information and vision information. However, this official report has not proposed programming of an alarm tone, i.e., the call sound of a pager.

[Translation done.]

MEANS

[Means for Solving the Problem] This invention consists of call sound programming equipment which enlarges possibility of programming a call sound, and an approach for it. By the approach, a call sound calls the message, when it is sent to a mobile station and received in the form of the call sound message containing the identifier specified as it is a sound, the call sound message is specified based on a call sound discrimination child, and this message is corrected to the form of being suitable for a call sound generator and memory, after that. A call sound is preferably transmitted by radio. In this case, a call sound can be sent to a direct receiving set, without making it prepare for the call sound which calls first and enters sound memory without prior announcement. It can let a voice channel pass or a call sound can be sent as a mobile data message apart from a voice channel. It is USSD (Unstructured Supplementary Service Data) different from a voice channel (non-structured auxiliary service data), or a call sound can be sent as an alphabetic character of a short message by the off-line infrared link of an IrDa mold. USSD -- GSM specification -- setting -- for example, -- It is the document of TS GSM 02.04, TS GSM 02.30, TS GSM 02.90, TS GSM 03.38, TS GSM 03.40, etc., and is specified in detail. The mobile station of this invention has a means for [which detected the call sound discrimination child in a message, and was received] calling, calling a sound message and correcting for a sound generator and call sound memory. The mobile station of this invention can have a means

for correcting so that the call sound memorized by call sound memory can be sent to the 2nd mobile station. A mobile station has a means for adding a call sound discrimination child to a message for transmission. A call sound is preferably sent as note data, and the note data is corrected to the note which specifies the call sound in that case at the time of reception.

[0010] This invention relates to the migration communication system accompanied by a mobile station, and the mobile station for radio. It While having the memory which remembers a call sound to be a means for transmitting and receiving voice, and a means for entering and reproducing the call sound as a signal of a call It is characterized by having a means for changing into an alphabetic character the call sound memorized by this memory, and sending it, and a means for sending with the call sound discrimination child who specifies said alphabetic character as the transmission information is called and it is sound transmission information.

[0011] This invention relates to the migration communication system accompanied by a mobile station, and the mobile station for radio. Moreover, it While having the call sound memory which remembers a call sound to be a means for transmitting and receiving voice, and a means for entering and reproducing the call sound as a signal of a call The means for detecting the call sound discrimination child who the means for receiving the message accompanied by an alphabetic character and its message in the received message call, and tells that it is a sound, It is characterized by having a means for receiving a call sound as an alphabetic character, and a means for changing said alphabetic character into the form memorized by this call sound memory.

[0012] Furthermore, it is characterized by being sent to telephone as an alphabetic character in the call sound discrimination child specified as it is reproduced as a response of as opposed to [by that approach, a call sound is memorized by memory about the approach this invention programs the call sound of telephone, enter with a sound reproduction means, and] a call, as for this approach, a call sound is changed into an alphabetic character, that transmission information is called and it is sound transmission information.

[0013] This invention is characterized by to have a means for changing this call sound into an alphabetic character, and sending said alphabetic character, and a means for sending with the call sound-discrimination child who specifies said alphabetic character as the transmission information calls and it is sound transmission information while it has the call sound memory the terminal unit remembers a call sound to be also about the terminal unit for data transmission, and a means for transmitting the call sound.

[0014] In the 1st example of this invention, a call sound is sent by the short message as an alphabetic character. Since the message does not maintain a voice channel at a busy condition (engaged) when a call sound is sent to a mobile station by the short message, the user can be talking to coincidence with the mobile station. This short message is memorized by the memory of a transmission channel, and even if a call sound has [even if] a busy mobile station or is switched off during transmission in that case, it is sent to a mobile station.

[0015] It can call through the Internet from a computer and a sound can also be sent by the short message. Therefore, the users of a mobile station call and a sound can be sent mutually. A call sound is preferably sent as note data in the form of the alphabetic character in a short message. The mobile station of a receiving side receives the short message as an ordinary short message, and the prior announcement about the message which enters is unnecessary. The short message has a predetermined identifier, the mobile station of a receiving side calls it, is specified as a sound, and calls it, and sound memory is made to memorize it based on it. Moreover, in the mobile station of this invention, it is possible to call to a desirable thing with a user interface, and

to program a sound by oneself, and a user can send mutually the call sound of the others which call and are memorized by the memory of a sound or a mobile station programmed by itself in that case. Therefore, the received call sound which is memorized by memory is also correctable with a user interface.

[0016] This invention simplifies programming of a call sound, and the user of a mobile station does not need to make it able to prepare for it not being necessary to operate it namely, in order for a new call sound to come to hand, and not programming a call sound with a user interface, calling to a mobile station, and receiving a sound, and can receive it directly by radio. Moreover, this invention increases possibility of programming a call sound, and a user can call from the 2nd user and can receive a sound. Since a call sound message calls the message which the mobile station itself received even if the user did nothing since the call sound discrimination child was included and specifies it as a sound, reception of a call sound is easy for it.

[0017] Next, with reference to an accompanying drawing, this invention is explained in detail.

[0018]

[Embodiment of the Invention] For an understanding of the 1st example of this invention, transmission and reception of a short message are explained below.

[0019] In digital migration communication system, such as a GSM system, short text messages, i.e., the so-called short message, can also be sent besides a message and data transmission. It is known for the GSM system as SMS (Short Message Service). With a mobile station, receiving from the 2nd mobile station can also send text messages to the 2nd mobile station. One of the advantages of the short message service of a GSM system is being able to send a short message during a message at coincidence, or being able to receive, when the ordinary circuit joint communication link is performed. Therefore, it prepares for possibility that a call will enter, and a mobile station is not maintained at a busy condition (engaged) even if the short message is transmitted.

[0020] When a short message is transmitted, even if the advantage of the short message in the comparison with a message with telephone cannot contact a receiving set, it is being able to send this message to a receiving set. i.e., a short message, realized when this divides transmission of the short message from the 1st mobile station to the 2nd mobile station into two parts as shown in drawing 1 is sent to SM-SC (Short Message Service Centre (short message service pin center, large)) from the mobile station MS 1 which transmits, a short message is memorized here, and immediately after being able to contact, it is immediately sent further to the mobile station MS 2 of the actual destination, i.e., a receiving side. The connection with migration communication system from short message service pin center, large SM-SC is illustrated in detail by drawing 2. Next, with reference to drawing 15, it explains that a short message flows [transmission and] between various interfaces.

[0021] Drawing 2 shows the structure of migration communication system, and the connection for transmitting a short message. A mobile station MS is connected to a base station BTS by radio. A base station BTS is further connected to the base station controller BSC which controls and manages some base stations through the so-called Abis interface. The stereo which consists of one base station controller BSC which controls some base stations (usually dozens of pieces) BTS and those base stations is called base station system BSS. Especially the base station controller BSC manages a radio channel and hand-over. On the other hand, the base station controller BSC is connected to migration service exchange center MSC through the so-called A interface, and this MSC adjusts formation of both the connection from a mobile station, and the connection with a mobile station. It lets migration service exchange center MSC pass, and

connection out of a mobil radio communication network is formed further. Above-mentioned short message service pin center,large SM-SC is combined with migration service exchange center MSC.

[0022] A user writes in the message which should be sent (using the user interface of this mobile station), or searches from memory and presents the telephone number of the mobile station MS 2 which is going to send the message, i.e., the identifier of a mobile station MS 2, to send a short message with a mobile station MS 1 (drawing 1). Moreover, the mobile station should have contact information, i.e., the telephone number of short message service pin center,large SM-SC. Usually, it is memorized by the memory of a mobile station, and whenever it tends to transmit each short message in that case, it does not need to input the telephone number separately.

Therefore, when sending a short message, this message goes to a base station BTS from a mobile station MS, and goes to short message service pin center,large SM-SC further through the base station controller BSC and migration service exchange center MSC from there. Although a short message is memorized by short message service pin center,large SM-SC and this short message is further sent to the mobile station MS 2 by the side of reception from there, although the path of this message is the same transmission route, the direction is reverse in that case. Short message service pin center,large SM-SC receives [whether the mobile station MS 2 received the short message and] a notice. Therefore, if the mobile station MS 2 has not received it by a certain reason, the short message can be resent.

[0023] Moreover, a short message can be sent from PC. In this case, migration service exchange center MSC connected with Server GTW (gateway), and this server is connected with the Internet. In this case, PC linked to the Internet can download from the Internet the WWW (World Wide Web (World Wide Web)) page which Server GTW has for transmission of a short message. If a user inputs the telephone number of the reception side mobile station MS 2, and the message which transmits into this WWW page, that message can be sent now from this PC, a message will go to migration service exchange center MSC through the Internet and Server GTW in that case, it will go to short message service pin center,large SM-SC further, and that message will be further sent to the mobile station MS 2 by the side of reception through a mobil radio communication network from here.

[0024] It is possible to send the message of die length of 160 characters at the maximum at once by the short message service SMS of a GSM system. An alphabetic character is the 7-bit ASCII (American National Standard Code for Information Interchange) alphabetic character (American Standard Code for Information Interchange), therefore the greatest die length of the message expressed with the bit is 1,120 bits, i.e., 140 bytes. The ordinary mobile station as shown in drawing 3 has a small display and the keyboard which progressed, can write a short message by this, namely, can input various alphabetic characters and figures. The received message is expressed as the display of the mobile station which makes it possible to display an alphabetic character and a figure as shown in drawing 3 .

[0025] As everyone knows, transmission information is divided into some frames in the GSM system. When the die length of the message which should be transmitted is longer than the length between couplings with which Frame FR is permitted, Message M must be divided into partial M1-M4, and must be sent by some (segmented) frame FR1-FR4 as shown in drawing 4 (A). At the time of reception, a mobile station reconfigurates the message M currently divided at some frame FR1-FR4 as shown at drawing 4 (B). In a wireless interface (drawing 2), the maximum length of a frame is usually 168 or 184 bits, therefore a short message (the maximum length is 1,120 bits) must be divided into some frames. Drawing 5 shows the frame transmitted

with a wireless interface, and the so-called LAPDm frame (Link Access Protocol for the Dm channel (link access protocol for Dm channels)), and it is usually divided into the three fields. The 1st field is address field ADD and this includes the address (namely, mobile station identifier of a receiving side) expressed with some cutting tools of the destination of the message. In a GSM system, a signaling message is also transmitted within the corresponding LAPDm frame. In radio, the flow (namely, a signaling message and a short message) of two messages may exist in coincidence independently mutually. the link identifier by which the two different flow should be added to address field ADD -- namely, -- being the so-called -- it dissociates mutually "SAPI and (Service Access Point Identifier (Service Access Point identifier)) be alike." The value can be 3 which means signaling, or 0 which means a short message. The 2nd field is control field CTRL and this field contains transmitting frame number N (S) and receiving frame number N (F). The 3rd field is the data field INFO which includes actual information, and this includes the contents of 168-bit information, i.e., an actual short message, at the maximum. [0026] Transmission of each call sound is specified, specific character code, i.e., identifier, in that case, the mobile station of a receiving side can process the message which received, and direct conversion can be carried out [sound / as specified / call]. That identifier is preferably expressed with the ASCII character in the information field (drawing 5) INFO, i.e., the field, of a short message transmission frame, and this field includes the actual short message expressed in written form. This identifier is an identifier created by the approach of the identifier on which it has agreed beforehand, or others, and knows with that as which it calls and the both sides of the equipment of a transmitting side and the equipment of a receiving side mean a sound (for example, sequence-of-numbers "120" of the beginning of a short message). Since a call sound is sent by the short message, although this kind of call sound programming service is not supported, it is receivable with the ordinary mobile station which can transmit and receive a short message. If a call sound identifier is put on Field INFO, although this kind of call sound programming service is not supported, it will call and the advantage which called with the ordinary mobile station which can transmit and receive a short message, and was expressed with the sound identifier and the alphabetic character that both sounds are displayed to a user will also be acquired. Moreover, it is also possible by writing the identifier of the call sound in question in a message in written form, dividing correctly in written form, the further remaining information, i.e., call sound, and writing it in first, with this kind of ordinary mobile station, to transmit a message like the above-mentioned message. The call sound to which receiving **** was received completely is made with the mobile station of this invention in such transmission information.

[0027] Or the identifier of the short message which includes a call sound is formed as a specific bit code of the address field of a short message, or control field (see drawing 5). Also in this case, although the transmitted call sound is receivable as an alphabetic character with an ordinary mobile station, that call sound cannot be memorized by call sound memory. In this case, if a mobile station is not changed so that said bit code may be added by the specific command, a user cannot send this kind of call sound with an ordinary mobile station, even if other parts can input a right alphabetic character (if there is nothing as if, because an ordinary mobile station cannot tell a call sound identifier).

[0028] Instead of carrying out the character code (inside of a data field INFO) of the call sound identifier in a short message, and displaying it, it can display within the address field ADD of a short message, and this identifier is expressed with a bit in that case. the specific cutting tool in the address field of the transmission frame of a short message -- being the so-called -- TP-Data-

Coding-Scheme (TP-data coding device) -- it is -- it -- GSM specification GSM 03.40 -- and -- It is specified by 03.38. Since 4 bits of that cutting tool's least significant can be used freely, it can indicate that this short message calls and the sound is included by using them and giving the value with which it has agreed on 0000 or others above cutting tool b3-b0 (this b0 is this cutting tool's least significant bit) according to this invention.

[0029] If a call sound is displayed on this appearance, it will not take the tooth space left behind for the die length (they are 160 characters at the maximum) of the alphabetic character of a short message.

[0030] As follows, a call sound can be changed into an alphabetic character and it can include in a short message as an alphabetic character of the form of a note.

score expressed in written form: C, D, ..., G, A and H Note from A to G of a low octave c, d, ..., g, a and h Note from A to G of a quantity octave # the note to precede -- semitone -- ***** (for example, high (high))

b [] the note to precede -- semitone -- ***** (for example, blunt (dull))

Persistence time: Have no alphabetic character. The basic die length - The note to precede: One half of basic length + The note to precede: Twice of basic length - The note to precede: 1.5 times of basic length .. The note to precede: 1.75 times of basic length [0031] A single alphabetic character contributes to the effectiveness of the alphabetic character always preceded with it cumulatively [a die-length alphabetic character]. for example, C+ -- 3 times of basic length -- meaning -- C --- means 0.125 times of basic length.

Rest: ; Rest; the same die length as basic length Rest; the die length of the one half of basic length [0032] Other rests can be inputted with the alphabetic character which corrects the die length of a note using a rest alphabetic character.

[0033] As mentioned above, the received alphabetic character is processed, the call sound made by the note can be encoded in the alphabetic character which can be sent by the short message, it calls and can be changed into a sound, and at the time of reception, when [at which a telephone rings] transmitted, it can be memorized by call sound memory, and it can be reproduced.

Therefore, this approach is suitable for especially the equipment that a call sound can be programmed as a note through a user interface, or a call sound calls as a note, and is beforehand memorized by sound memory.

[0034] other element relevant to a call sound besides the above-mentioned specification, and its specification -- for example, ::ACD:X which can also be specified as an alphabetic character as follows here -- a number (integer) with optional X -- it is -- note train only an ACD X time is made to repeat -- if -- if there is no X -- 2 times.

/X ACD/ Here, X is an optional number (integer), for example, is a number. By breaking by X, it is an alphabetic character. "/" The die length of an inner note is shortened. At this specification, a third note is "/3 ACD/". It is expressed with the sign to say.

\$ For example, it is not necessary to input Sharp or a flat note about no notes in a parenthesis, and to input alphabetic character # or b independently about these notes in that case.

(:) (5CD:2 E:F) specified repeatedly It is performed with CDE CDE CDF CDCD.

! Carry out switch-on / switch-off of the "staccato (staccato)" music mode to the following alphabetic character, only a suitable rate lengthens the die length of a note, make the rate of a pause small, and attain a fragmentary style, without changing the whole time amount. computer simulation -- the die length of a note -- 50-60% -- or even if it lengthens no less than 70%, it is echoed still better.

? Switch-on / switch-off of the separation note function is carried out to the following alphabetic

character, only the minimum time amount lengthens the die length of a note, a pause continues over the remaining part of music playback time amount, unlike "flow (flowing)" music mode, the two same continuous notes can be heard as a separate note, and the note to precede can be heard as one note here. The pause between notes must have the same persistence time. A note shorter than the specified pause cannot be heard with a separate note. In computer simulation, the pause between the notes which continue for about 30ms is echoed good by the separation note function.

' -- A default octave (a default octave) is raised. If a default octave is 1, it will be raised to 2, otherwise it is 1.

" -- A default octave is lowered. If a default octave becomes three, it will be lowered to 2, otherwise it is 3. If it is assumed that four octaves are used, they will be a capital letter and a small letter as mentioned above. C..H and c..h Two octaves can be used for coincidence.

X All notes that follow X is raised only 1 degree (one degree). Here, X is an integer. If It will lower, if X is a negative number.

Number (number) (Number (alone)) Il Tempo and the number of beats per minute, for example, the number of the notes of the basic length per minute, are specified.

An empty tooth space is disregarded.

[0035] Moreover, :* which it can call [*] through a user interface and can combine other messages with a sound Flashing light-light when the telephone is ringing is switched to ON/OFF.

[0036] Next, with reference to drawing 6 , the configuration of the mobile station of this invention and its actuation at the time of transmitting and receiving a call sound as a short message are explained in detail.

[0037] The block diagram of the configuration of the mobile station of this invention is shown in drawing 6 . This mobile station is a mobile station which has the circuit and user interface which enable programming of a call sound preferably. A mobile station 1 has radio equipment RU (this reference mark is not describing in drawing) for the communication link by radio. This communication device the transmitting section 2 (encryption coding and an interleave --) known from the ordinary mobile station The receive section 3 (a reception and recovery) which consists of the block which performs modulation and transmission it consists of code discharge, interleave discharge, and an activation block -- it consists of the double (duplex) filter 4 which distinguishes the message by which it was received for performing transmission by radio in a list, and the message transmitted, and the antenna 5. This mobile station has the main control circuit 6 which controls the actuation. Furthermore, a main control circuit 6 has the RU controller 7 which performs the control function of a still more ordinary mobile station. Moreover, the main control circuit 6 of a mobile station has the block 8-12 for calling according to this invention and transmitting a sound as a short message. Therefore, it can say that the block 8-12 forms data-processor DU of a mobile station, and it can also be completely formed by programming a main control circuit (processor) 6. The control section of radio equipment RU and data-processor DU of a mobile station does not need to be unified by the main control circuit, they can also be separately realized to **, the RU control circuit 7 can be put on a radio equipment side, the DU processor 8 can be put on a data-processor side, and this DU processor 8 is connected with the RU control circuit 7 in order to establish the communication link between radio equipment and a data processor.

[0038] The 1st memory 13 is combined with the main control circuit 6 with the configuration shown in drawing 6 . This 1st memory may be volatile memory, such as RAM, and a main control circuit makes this memorize data in use. Moreover, a mobile station has the 2nd memory 14, as for this, it is desirable that it is Permanent memory 14, and data indispensable to the

function of a mobile station of a short message and call sound and others and other data memorized [user / make / it / **] permanently are memorized by the 2nd memory 14. Or a short message can also be made to memorize off-line in the memory (for there to be connection with a main control circuit 6 from here) of the intelligent card combined with a mobile station. This kind of intelligent card is known as a SIM card (Subscriber Identity Module (subscriber identity module)) for example, from GSM migration communication system, and it usually has the storage which memorizes the telephone number etc.

[0039] The user interface of a mobile station consists of input units, a display 15, the keyboard or others, for example, the touch display etc., for inputting data, etc., 16.

[0040] When data-processor DU and radio equipment RU are constituted as an isolated system about a function, both are in common or, as for them, should have separate memory 13 and 14 and a separate user interface UI. The communication link between those equipments is established by connection between the DU processor 8 and the RU control circuit 7, and it is called the external control interface ECI by this relation.

[0041] Next, actuation of the mobile station when transmitting a call sound is explained.

Although a desired call sound is searched from memory by the user interface UI, as for a control circuit 7, based on 16 kinds of commands from an input unit, a call sound is searched from memory 14 in that case. When inputting the command with which a user calls with an input unit and sends a sound, although a character string is created from a call sound, this processor puts call sound discrimination children, such as sequence-of-numbers "120", on the beginning of the character string (when this identifier is not displayed by the address field), it is called to a degree, changes a sound into alphabetic characters, such as the above-mentioned ASCII character, and, as for the DU processor 8, places the alphabetic character after this identifier. As mentioned above, via the air, a short message is a bit, namely, is sent as the binary character in a frame. The DU processor 8 converts an ASCII character with the binary character. One method of performing this conversion is explained later. Therefore, it has the transliteration function to process an alphabetic character, it realizes programmably and it is memorized by memory 14, the DU processor 8 searches the program and the DU processor 8 performs this function after this according to the program. The DU processor 8 transmits the created character string to the SMS transmitting controller 10, and adds this controller to that message based on the information as which the user inputted address information, i.e., the information about the destination. Therefore, this kind of SMS transmitting controller is a kind of bit and/or character generator. It realizes as an application program preferably, the function to change a call sound into an alphabetic character is memorized by memory 14, and the DU processor 8 uses it.

[0042] If address information is added by the SMS transmitting controller 10, the message is transmitted to an out-box 11, this tries to send the message, it has a buffer, and supposing transmission goes wrong, this message will be memorized in it. Supposing transmission goes wrong, an out-box 11 will carry out the attempt which resends a message. If the DU controller 8 notices radio equipment RU being in the condition that a message can be sent That message is transmitted to the message transfer operating circuit (message transfer running circuit) 12. This circuit 12 Validity information (validity information) (this) Whether it goes to a message service center from the message progressing in which direction, i.e., a mobile station Or the information relevant to the migration communication system in question, like it is shown whether the it progresses conversely is added to the message. Carry out transform processing to the form where migration communication system requires address information, and the address and the short message identifier (SAPI) of a message service center are added to this message. The digital

signal for a sending set 2 is formed from the information which should be transmitted, and this message is sent to the wireless transmitting section 2 of radio equipment RU. When a call sound discrimination child is put on the bit of an address field ADD, an operating circuit 12 adds the identifier in question to this message. The transmitting section 2 creates the frame which should be transmitted based on the signal with which it encoded according to the specification (specification) of migration communication system, and this transmitting section received the signal from the operating circuit 12, a sending set is sent to short message service pin center, large SM-SC by radio, and, as for this frame, this frame is further sent to a receiving set (see drawing 1) from delivery and here. In the transmitting section 2, a message receives processing of coding, an interleave, encryption, burst formation, a modulation, transmission, etc. according to migration communication system.

[0043] Block 8 and actuation of 10-12 can also be performed with PC connected to a short message service pin center, large through the Internet. Actuation 8 and 10-12 may be performed programmably, and can make the memory of a computer memorize various call sounds with the processor of a computer. In that case, naturally block 12 can be combined with the output port or modem of a computer, and it can assume that the Internet can be contacted from there, therefore a message can be sent to a short message service pin center, large, and this short message service pin center, large transmits a short message to the mobile station of a receiving side as shown in drawing 2 .

[0044] Next, actuation of the mobile station at the time of receiving a call sound as a short message is explained. When a communicator calls and a sound is received as a short message, the message reaches radio equipment RU first. Then, according to migration communication system, processing of reception, a recovery, code discharge, interleave discharge, decode, etc. is performed to the message in a receive section 3. This can be memory the received frame identifier (SAPI) remembers a message to be although it will be transmitted to the destination box 9 of a data processor if the message shows that it is a short message. the memory by which the received short message is put on the SIM card -- or Permanent memory 14 of a mobile station can memorize. If the received message is an ordinary short message, the DU processor 8 will tell the received short message. If the message has the identifier which the message calls and shows that it is a sound, the DU processor 8 converts the binary character with an ASCII character, will call the ASCII character further, will change it into a sound, and will make Permanent memory 14 memorize the call sound. Or this contractor will understand that a user can be first asked about whether a Permanent memory is made to memorize it [having been received] which calls and accepts a sound. Moreover, an error checking can also be added to conversion actuation so that DU processor may inspect whether the received sequence has an error. Although the call sound sequence will be called as a call sound and the sound memory 14 will memorize if errorless, reception of a short message is displayed to a user as a received call sound in that case. When there is an error, the call sound sequence is only memorized by the short message memory 14 as an ordinary short message without call sound memory's memorizing. If a call sound is received with the sufficient result, the DU processor 8 can start the application which programs and calls a call sound and is displayed on a display 15 by making a sound into a note (if the mobile station has such application).

[0045] Next, one method of converting an ASCII character with the binary character is explained. An ASCII character can be displayed as a hexadecimal and it can be changed into a binary number still more easily. Next, it explains how a word called "Calling" is changed into a binary number. By the following description, two hexadecimal separated in the tooth space correspond

to an ASCII character, the alphabetic character of the hexadecimal of each can be expressed with 4 bits, namely, each ASCII character is expressed with 8 bits as follows.

ASCII character: Calling Form of a hexadecimal: 43 61 6C 6C 69 6E 67 Form of a binary number: 0100 0011 0110 0001 0110 1100 0110 1100 0110 1001 0110 1110 0110 0111 [0046] In actual transmission, an alphabetic character is sent without a tooth space one after another as a continuous bit string. Therefore, in order for there to be a specific hexadecimal form and a specific binary number form and to specify a note by the ASCII character in this case about each ASCII character, the example shown above is convertible for the alphabetic character of a binary number.

[0047] If assignment of a note is changed into the call sound message of the form of a binary number, it is an infrared signal according to an infrared link, or can send easily by USSD, and it can also be sent as an alphabetic character as well as the case of SMS in that case. It is possible to prepare an infrared link as everyone knows, in order to transmit and receive an infrared signal to a mobile station. Therefore, the mobile station other than the wireless part 2-5 can have the infrared sending set and infrared receiving set which were similarly connected to the main control circuit 6 as shown in drawing 6 . In order to send a call sound by USSD, correction required for the transmitting block 2 and a receiving block 3 can be performed.

[0048] Although another method of sending a call sound as an alphabetic character changes it into a MIDI (Musical Instrument Data Interface) form (musical instrument data interface) first, this is the communications language of common knowledge for musical instruments. This can be performed by preparing a MIDI converter in a mobile station. A MIDI converter is preferably put on the DU processor 8, and the DU processor 8 changes the alphabetic character received by MIDI at the time of reception into the form of being suitable for the call sound generator and memory of telephone, in this case. Similarly, at the time of transmission, a MIDI converter changes a call sound into an alphabetic character according to a MIDI form. A MIDI converter makes it possible to call by the composition program (composition programs) based on the computer which supports a MIDI form, to compose a sound, and to send the made melody to a mobile station by the short message from a computer.

[0049] Next, with reference to drawing 7 (B), the approach as one example of realizing the above-mentioned application for calling with a user interface and programming a sound, i.e., the one approach of calling by telephone and programming a sound as a note, is explained. In this example, a score (stave) can be made on the display 15 of a mobile station, a desired note can be chosen by the menu and Keys 30a and 30b which were displayed on the display, and that selected note can be put on the location of a request of the score currently displayed on the display with the cursor moved by the key. In a mobile station, a large-sized display can realize the display shown in drawing 7 (B), or, similarly the score of a graphic form can be realized on the liquid crystal display of a matrix type on the display of the size of an ordinary mobile station.

[0050] In this example, while being able to choose the desired Oboe notation (clef) from the menu displayed on a display through a key, a note can be put on the location always directed by cursor, and that persistence time and pitch (pitch) (namely, location on a score (stave)) can be changed into Keys 30a and 30b and a list with a menu. in order to correct the persistence time of a note -- key 30b -- letting it pass -- a persistence time menu -- accessing -- browsing key 30a -- letting it pass -- 1/8 note (eighth note), a quarter note (quarter note), a half note, and a whole note -- or 1/8 rest, a quarter rest, a half-rest, and all rests can be chosen on a score. These notes are shown in drawing 7 (A). Similarly, in order to correct the pitch (location of the perpendicular direction on the score of the note) of a note The location of the note on a score can be raised by

pushing browsing key (browse key) 30a in the one direction (this key pointing out the upper part). Moreover, the location of the note on a score can be lowered by pushing browsing key 30a in other directions (this key pointing out a lower part). Thus, for example, a rest, c, d, e, f, g, a, h and c1, d1, e1 and f1, g1, a1, h1, c2, d2, e2, f2, g2, a2, h2, etc. can be made from any notes to wish. It lets browsing key 30a pass. Sharp (cis, dis, eis, fis, gis, ais, his, cis1, dis1, ..., cis2, and dis2, ..., his2) and a flat (ces, des, es, fes, ges, as, b, ces1, and des1, ..., ces2 --) The note of des2, ..., b2 can also be made, and although the notation which shows the Sharp note or a flat note before a note on a display in that case is made, it is also shown in drawing 7 (A). Thus, a desired note and a desired rest can be made in order on a score so that a melody may have 60 continuous notes at the maximum, for example. The example of the display of the mobile station used as melody creation mode is shown in drawing 7 (B), this drawing shows a score, the Otobe notation, various notes, and cursor (arrow head), and it directs the location of a note and can change that die length (persistence time) and pitch like the time of choosing the above-mentioned note. On the score shown in drawing 7 (B), the 3rd note and the 4th note are the examples of the Sharp (it went up) note from the left.

[0051] As an alternative plan which makes a sound (tones) with a key and a menu, a note can be displayed as an icon (icons) on a display on a score, this icon can be dragged with the pointer moved with the so-called spin wheel and the so-called trackball (track ball) (drag), and it can release in the location of the request on a score (that is, it places). If a touch display is used, it is necessary to use neither a spin wheel nor a trackball, and the icon in question can be placed on a score with a finger or a pen in that case.

[0052] Moreover, by the user interface, Il Tempo can be set up with the number bpm of beats around for 1 minute etc., and the created call sound (melody written on the score) is reproduced by the Il Tempo. In this case, the die length of the quarter note expressed per ms is $t = 1000 (60 / \text{tempo})$, and in this case, if Il Tempo is 150bpm(s), the die length of a quarter note (fourth note) will become 400ms or 0.4 seconds. It is this Il Tempo 50 ... It can set up by the number between 999bpm(s). Il Tempo is set up by choosing the Il Tempo command from a menu preferably, and can input desired Il Tempo on a display through a key in that case.

[0053] It is also programmable through the ordinary keyboard of the telephone which displays on a display by making a note into a literal notation as an option, and has/or 12 keys (a key 0-9, *, and #). In this case, it can let a specific key pass or each sound (a note or rest) can be made as a combination of two keys. Pressing one or two keys corresponds to a specific sound. In this case, as mentioned above The note corresponding to it can be displayed on the display of a mobile station as a response to the actuation which presses this key (as a literal notation -- as the note on a score). The sound can also be reproduced through the loudspeaker of a mobile station as a response to the actuation which presses a key, and a user can hear it in that case. the persistence time of the actuation which presses a key -- or the persistence time of the actuation which the latter pushes when actuation to push is performed twice in succession is proportional to the die length of the sound. Moreover, by the approach same with having mentioned above about calling for a short message and, for example, changing a sound, it can call by inputting an alphabetic character through a user interface, and programming of a sound can be performed.

[0054] Next, with reference to drawing 6, how to call by telephone and create a sound is explained. central apparatus 6 are memorized by memory 14 by the short message considering the sound (note) chosen from the user interface UI which consists of a keyboard 16 and/or a display 15 according to the above-mentioned approach by the user or -- as a melody with perfect reception and it. When a call enters, according to the specification of migration communication

system, the message from a base station reaches a mobile station first. This message is received by the receiving set 3 from the antenna 5 of a mobile station, and this message reaches central apparatus 6 from there. Answering this, central apparatus 6 give a control signal 19 to an acoustic generator 17. Although an acoustic generator 17 emits a call sound based on the control signal, it is the sequence of the sound which has a specific frequency based on the melody specified by the note. Central apparatus 6 make a control signal by reading the call sound memorized by memory 14 from this memory 14. Therefore, the control signal 19 includes the information for the acoustic generator 17 which an acoustic generator 17 should make and which calls and specifies the class of sound for the call sound regenerative apparatus 20, and this equipment 20 is a converter for changing the electrical signal of a buzzer, a loudspeaker, or others into a sound. If telephone is answered when a user presses a response key, a user interface UI gives a signal to central apparatus 6, it will stop this equipment's calling to an acoustic generator as a response to the actuation which presses a key, and giving the sound control signal 19, and will call now, and a sound will die down.

[0055] Codec Codec of marketing currently manufactured by SGS-Thomson as an acoustic generator 17 Although ST5090 circuit can be used, it contains the acoustic generator which can make the sounds, i.e., the sound of 256 pieces from which a frequency differs respectively, spaced [between 15.6Hz ... 3,984Hz] at 15.6Hz. Although the frequency of a sound is made based on the 8-bit signal showing the number between 0-256, it is ** that correspond to the step 1 of several 1 acoustic generator of a control signal, i.e., the frequency of 15.6Hz, in that case, and several 2 deals with the frequency of 31.2Hz similarly etc. Therefore, although it can reproduce as a sound and the above-mentioned sound is explained by the following description about some of them with the following control signal (cutting tool) which is the following frequency (not a not necessarily exact value but the digit is shown), and is brought to an acoustic generator, the remainder may be determined by this contractor according to the above-mentioned principle.

[0056] a= 880Hz corresponds to step 56 of an acoustic generator, i.e., control byte'00111000', (in accuracy). $56 \times 15.6\text{Hz} = 873.6\text{Hz}$, ais=932Hz, and b= 988Hz correspond to step 63 of an acoustic generator, i.e., control byte'00111111', (accuracy $63 \times 15.6\text{Hz} = 982.8\text{Hz}$). c1 = 1,047Hz, 1 = 1,109Hz of cis(es), and d1 = 1,175Hz, 1 = 1,245Hz of dis(es), and e1 = 1,319Hz f1 = 1,397Hz and fis1 = 1,480Hz g1 = 1,568Hz and a1 = 1,760Hz, 1 = 1,865Hz of ais(es), and h1 = 1,976Hz c2 = 2,093Hz and cis2 = 2,217Hz d2 = 2,349Hz and dis2 = 2,489Hz e2 = 2,637Hz and f2 = Correspond to step 226 of an acoustic generator, i.e., control byte'11100010', 2,793Hz and 2 = 2,960Hz [of fis(es)] g2 = 3,136Hz and 2 = 3,322Hz of gis(es), and a2 = 3,520Hz (in accuracy). $226 \times 15.6\text{Hz} = 3,525.6\text{Hz}$.

[0057] Each sound c-a2 The frequency corresponding to those raised sounds and sounds made low is preferably defined beforehand in a mobile station (or sound required at least to make a call sound), for example, is memorized by memory 14. 60 bytes will be memorized by this memory, supposing 1 byte is memorized by memory 14 about each sound (tone or sound) which should be made and the melody consists of the sound of 60 pieces in that case. Central apparatus 6 search those cutting tools from memory 14 (12), and in order to call the melody and to reproduce as a sound, they control an acoustic generator 17. The aforementioned well-known ***** (codec) circuit also has clocked into and an internal clock signal generator, and it is illustrated by drawing 6 as an off-line clock generation machine 18 which controls actuation of an acoustic generator 17 according to specific clock tempo. This clock tempo is fixable so that Il Tempo of an acoustic generator may be set as 150bpm(s). Il Tempo can also be specified by the short

message, and it can also change through a user interface. Set-up II Tempo is memorized by memory 14 and an acoustic generator 17 is controlled to emit a sound by II Tempo to which this acoustic generator was set based on the signal received from the clock generation machine 18.

[0058] Central apparatus 6 identify the actuation which presses an alphabetic character (namely, alphabetic character made through the user interface UI), or a key, process them in the frequency corresponding to the actuation which presses this alphabetic character or its key, and memory 14 is made to memorize the signal corresponding to the frequency, and it is brought to an acoustic generator 17 when a call sound is reproduced.

[0059] Other approaches of making the control signal for a sound system 20 are using a counter, for example, the 16-bit counter counted down from 65,535 to zero, as an acoustic generator.

When reproducing sound, actuation of the counter is enabled so that it may count down from a predetermined figure (release). When a counter reaches 0, a pulse is generated and this counter begins to count down again from a predetermined figure. Sound consists of some pulses. A counter is counted in $1/18$ seconds from 65,535 to 0, and the pulse wave which is equivalent to 18Hz in that case is made. In this case, supposing 4,096 is given to a counter as a predetermined figure (a counter is counted from 4,096 to 0 in this case), the pulse wave which has a $\times(65,535/4,096)18=288\text{Hz}$ frequency will be made. Thus, the pulse wave which has various frequencies between 18Hz - 1.18 MHz can be made. The made pulse wave which carried out such can be used as Pulse Density Modulation which should be inputted into sound systems, such as a buzzer which vibrates according to the pulse wave.

[0060] As everyone knows, a user can choose from the present telephone the call sound which you want to reproduce when telephone sounds and which is memorized by call sound memory through a user interface.

[0061] This invention makes it possible for a new call sound to come to hand promptly and simply from telephone. A user calls through a user interface, and it is not necessary to program a sound or and he does not need to carry out to the service store which loads a call sound electronically with telephone. It is not necessary to prepare the call sound memory of telephone, and a call sound can be directly received by radio. Moreover, a user can call to the 2nd mobile station by himself, and can send a sound. Furthermore, it can call from the computer connected with the short message service pin center, large, for example through the Internet, and a sound can also be sent to a mobile station by the short message.

[0062] This specification gives an example for the configuration and example of this invention, and is explained. It is clear for this contractor that this invention can be carried out in another form, without deviating from that it is not that by which this invention is limited to the details of the above-mentioned example, and the description of this invention. The indicated example must not be understood as what limits for the purpose of explanation. Therefore, possibility of carrying out and using this invention is limited by only the claim. Therefore, various alternative also containing an equal object which is defined by each claim and which carries out invention is also the things of this invention within the limits.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the flow of the short message from a mobile station to the 2nd mobile station.

[Drawing 2] It is drawing showing the connection with a short message service pin center, large from migration communication system.

[Drawing 3] It is drawing showing the user interface of an ordinary mobile station.

[Drawing 4] (A) is drawing showing the segmentation to the frame of the message at the time of transmission, and (B) is drawing showing reconstruction of the message at the time of reception.

[Drawing 5] It is drawing showing the structure of a short message frame.

[Drawing 6] It is drawing showing the configuration and actuation of the mobile station of this invention when transmitting a call sound and receiving a short message.

[Drawing 7] (A) is drawing showing the note shown on the display of the mobile station of this invention, and (B) is drawing showing the example of the display of the mobile station for making a call sound.

[Description of Notations]

MS -- Mobile station

2 (TX) -- Transmitting section

3 (RX) -- Receive section

7 -- RU control circuit

8 -- DU processor

10 -- SMS transmitting controller

12 -- Message transfer operating circuit

13 -- The 1st memory

14 -- The 2nd memory (call sound memory)

15 -- Display

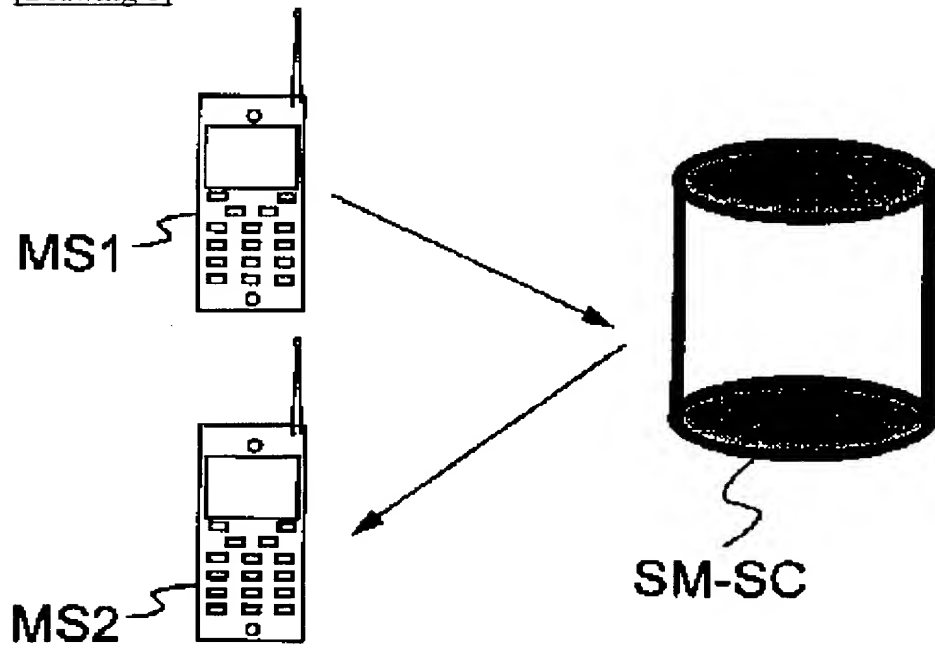
16 -- Keyboard

17 -- Acoustic generator

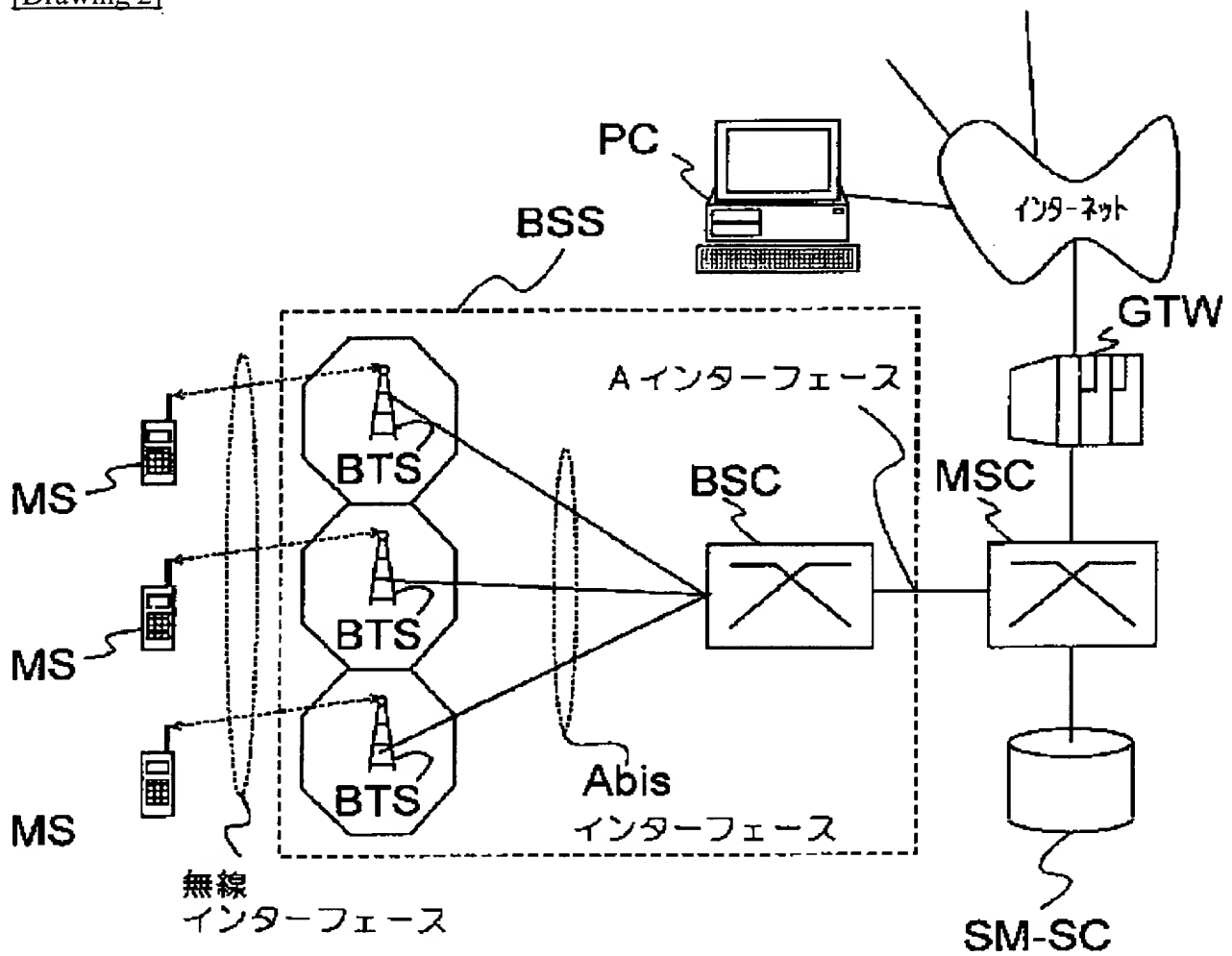
20 -- Sound system

UI -- User interface

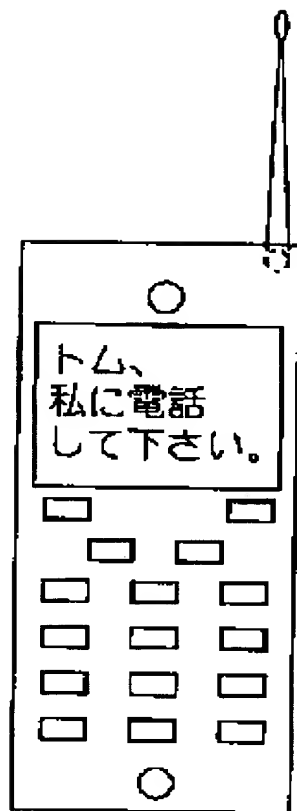
[Drawing 1]



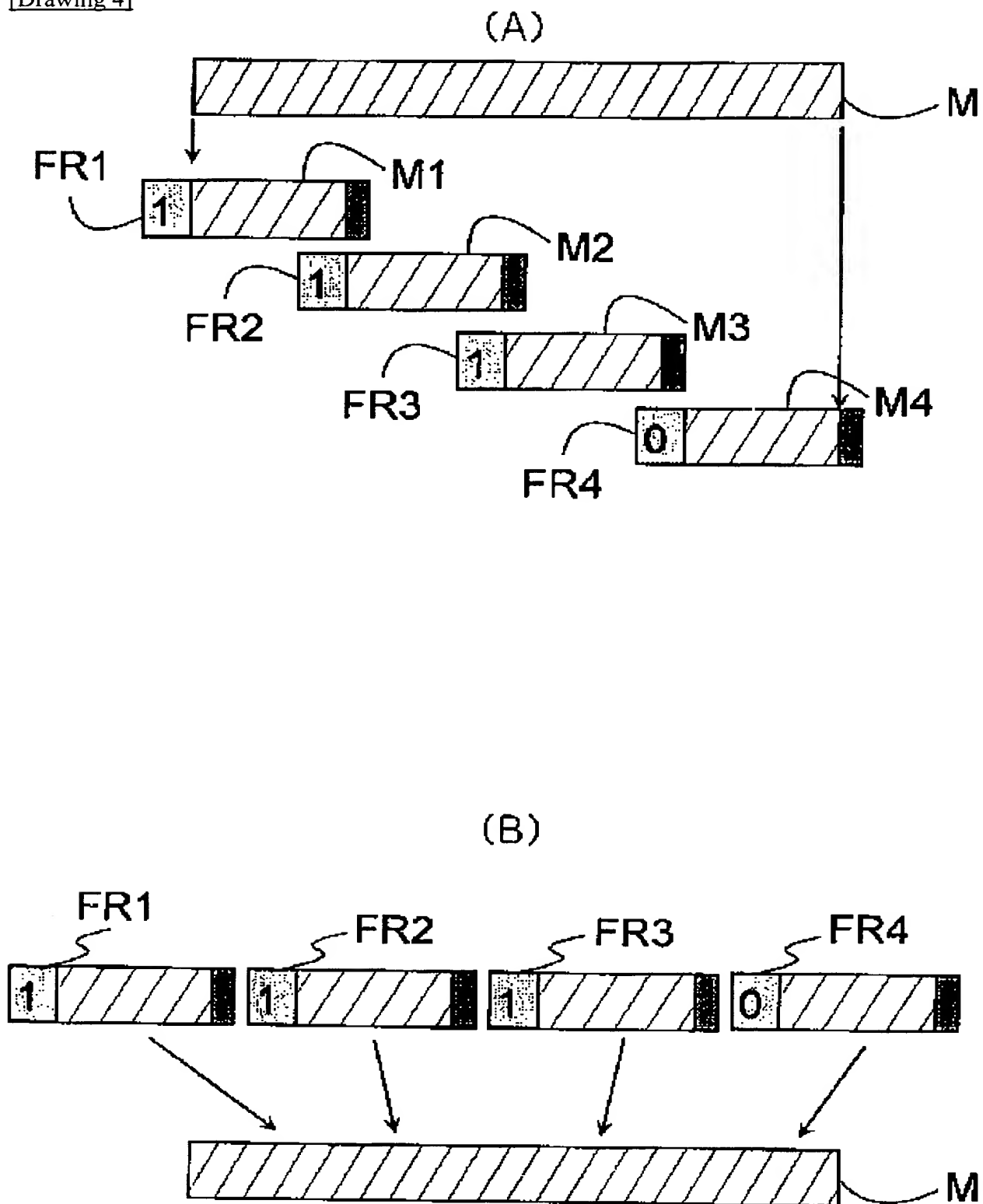
[Drawing 2]



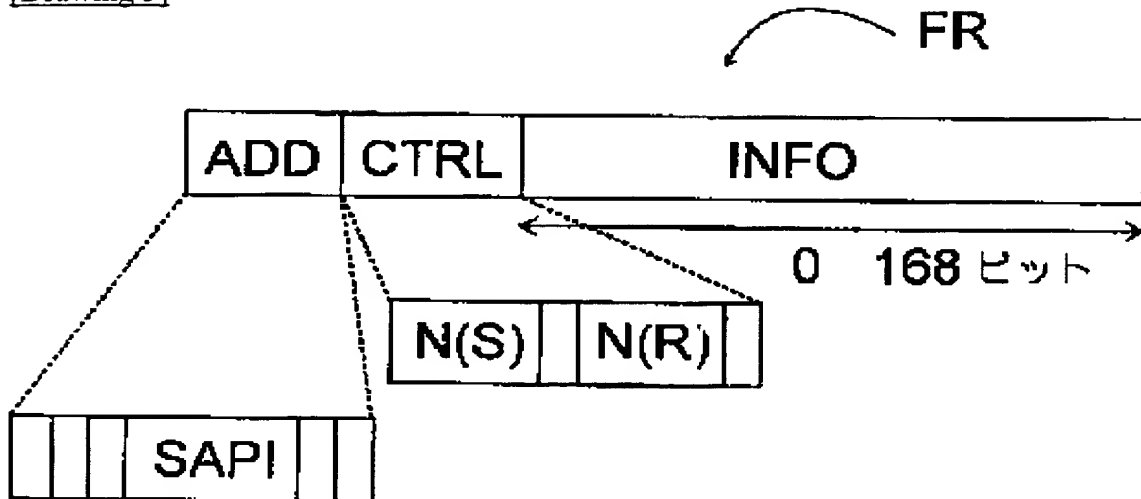
[Drawing 3]



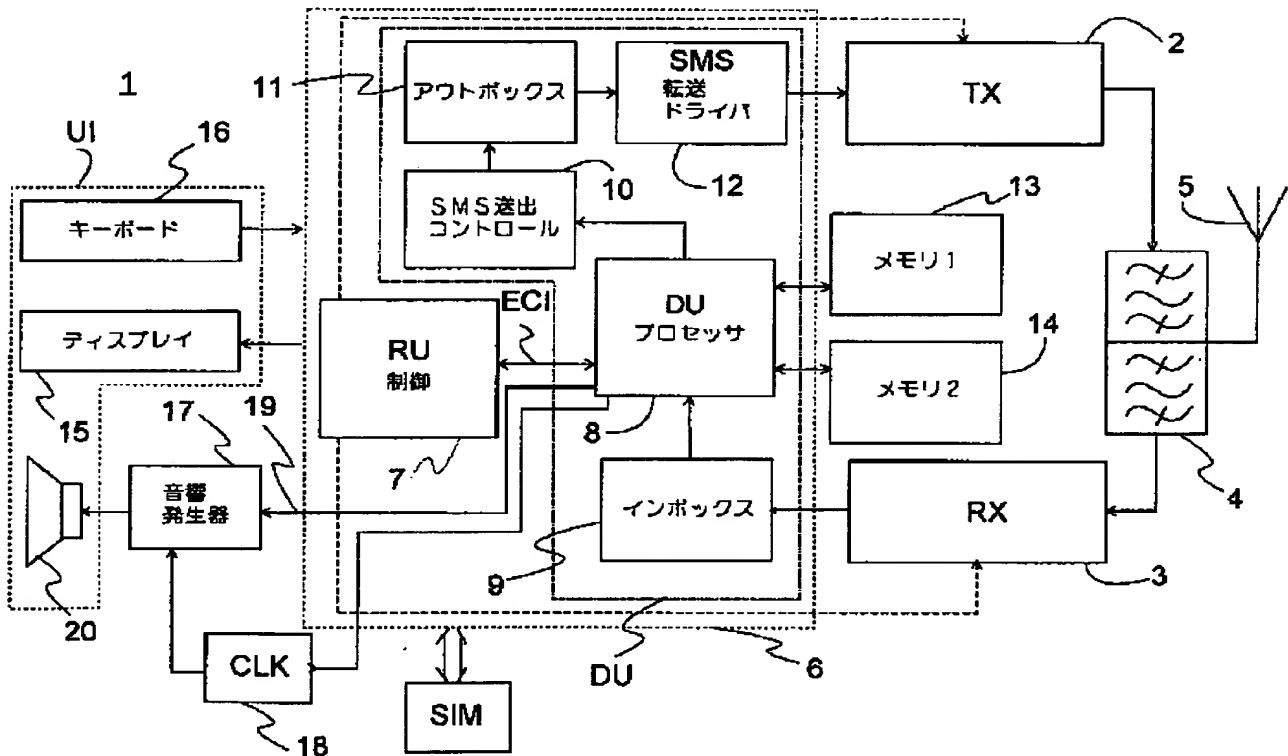
[Drawing 4]



[Drawing 5]













[Drawing 6]

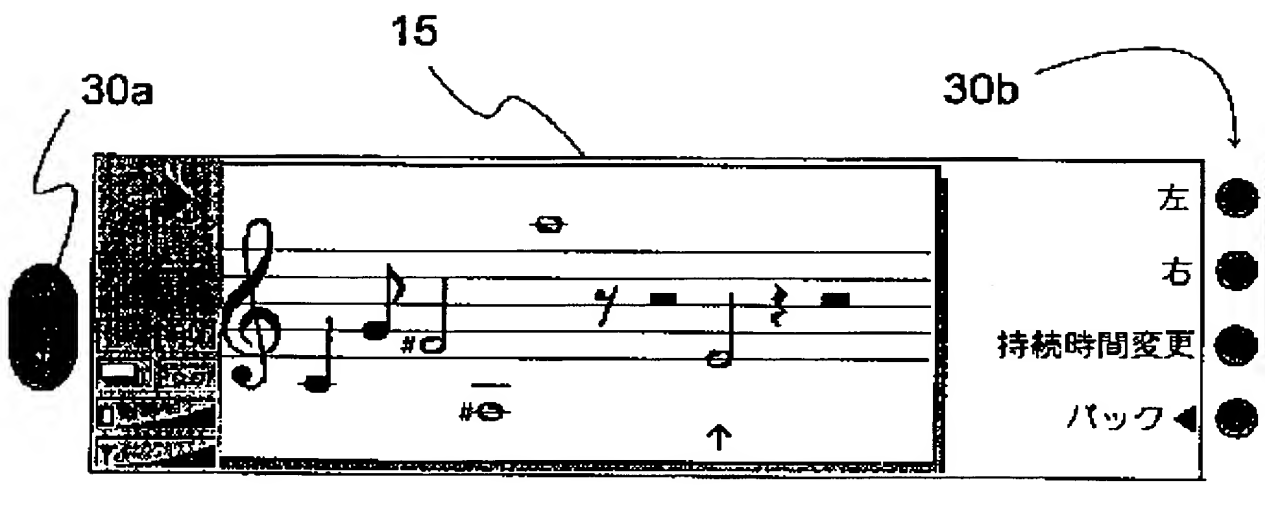


[Drawing 7]

(A)

長さ	音符	休止符
1/8		
1/4		
1/2		
1/1		
	フラット 	
	シャープ 	

(B)



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